California Academy of Sciences ❧ Annual Report

Natural History
Museum
& Aquarium

1982
1983

California Academy of Sciences

Golden Gate Park, San Francisco,
California 94118

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Frank H. Talbot

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On the cover: Released from its glass enclosure and augmented with changing lighting and vivid sounds recorded in the wild, the colorful Waterhole Group diorama in Simson African Hall is now helping to attract record numbers of visitors to the educational exhibits there. Back cover: The Aquarium's Pacific white-sided dolphin and a young visitor share a special quiet moment, while a harbor seal rockets past in the background. (All photographs by Susan Middleton, California Academy of Sciences, unless otherwise noted.)

MESSAGE FROM THE CHAIRMAN

AN EVENT-FILLED YEAR at the California Academy of Sciences was highlighted by spectacular exhibits, new research discoveries, and many educational events. Not so apparent to our visiting public was an exhaustive effort to examine ourselves and our direction. A masterplan for a new level of excellence was a result of joint efforts by the Executive Director and his staff, and members of the Board.

Scientific publications and important new collections are reported by each of the eight research departments of the museum. The Morrison Planetarium produced five excellent star shows and a number of laser shows. Three major public exhibitions were well received by our visitors: "The Heritage of Islam," "Crossroads of the Ancient World," and "The Photographs of Imogen Cunningham." Volunteers, docents and staff entertained and educated thousands of young people and adults within the Academy walls and on the frequent trips and tours arranged and led by experts from all areas of natural science and anthropology.

Academy scientists circled the globe on expeditions to collect material for research. Besides many domestic collection trips, studies were made of great white sharks off southern Australia, rainforests in Mexico, and tree frogs in Africa.

Dr. Bruce A. Bolt was elected President of the Academy and Chairman of the Science Council, and Dr. James C. Kelley became Vice President. After twenty-eight years of dedicated service, Brooks Walker resigned from the Board and was elected Honorary Trustee. Mr. George S. Ishiyama accepted election to the Board of Trustees as Mr. Walker's replacement.

To strengthen the relationship between the Academy and its 300 Fellows, a new Fellows Committee was set up, and Trustee Dr. John S. Hensill agreed to be its chairman. This committee is charged with developing an active program of symposia, producing a Fellows' Newsletter and seeking advice from the Fellows of the Academy.

The vigor of the Academy's program is possible only because of the ongoing support from Benefactors, Friends of the Academy, and Corporate donors. For example, Trustee Mrs. Paul L. Wattis sponsored major improvements in Simson African Hall; Mr. Lester Gunther, Sr. and his friends supported the new and popular penguin exhibit; the Bothin Helping Fund and Pacific Telephone and Telegraph provided funds for a new California trout stream exhibit; and the Mayor's Sister City Committee helped the development of a large, special exhibit on the old seaport of Haifa, "Crossroads of the Ancient World."

The Academy had much support from foundations and granting agencies during the year; a major grant from the San Francisco Foundation enabled us to develop the masterplan; the National Science Foundation sponsored the upgrading of collections and the purchase of a new scanning electron microscope.

The Academy's one hundred and thirtieth year was one of hard thinking about the future, but also a year full of activity and vigor in the Academy's mission of research and education. This enthusiastic performance on the part of Dr. Frank Talbot and his staff fills the Board with confidence for the years ahead.

RUDOLPH A. PETERSON
Chairman, Board of Trustees

Director's Report

MUCH OF THIS YEAR has been devoted to planning. Any new director faces the task of taking stock, determining directions in which to travel, and setting off on a fresh course. He would be a pretty poor skipper if he did not. But this is not easy to do, for it demands stopping the hard daily grind to take a clear and cool look at both strengths and deficiencies. To help us achieve this, the Academy has sought the advice of consultants from outside, who have come in without the emotional commitments that we carry and have assessed our various activities and given us advice. We have considered space needs, human traffic flow problems and visitor amenities, architectural concepts, design of some major future displays, communication and advertising, and an improved logo. We have also asked long-suffering colleagues from various museums and universities in the United States and Canada to visit us and make reports on all our departments, and we are much indebted to them.

Most of us feel a bit pummelled and probed by all these outside critics. But I think we all realize that the results are worth it. Each scientific department has now a clearer idea of its research aims and its collections policy. And a report by Verner Johnson Associates has outlined the serious space problems for the scientific collections, for staff, and for better public amenities, and has detailed our space needs. San Francisco architects Robinson, Mills and Williams have produced elegant solutions to these problems and to the circulation difficulties of the public display areas. As the year ends we still struggle with designs for a more educational and exciting use of the central courtyard. In this we are being helped

The California Academy of Sciences, San Francisco's natural history museum and aquarium in Golden Gate Park, informs and entertains a million and a half visitors each year with its exhibits on natural history, earth and space science, and anthropology.

Lloyd Ullberg

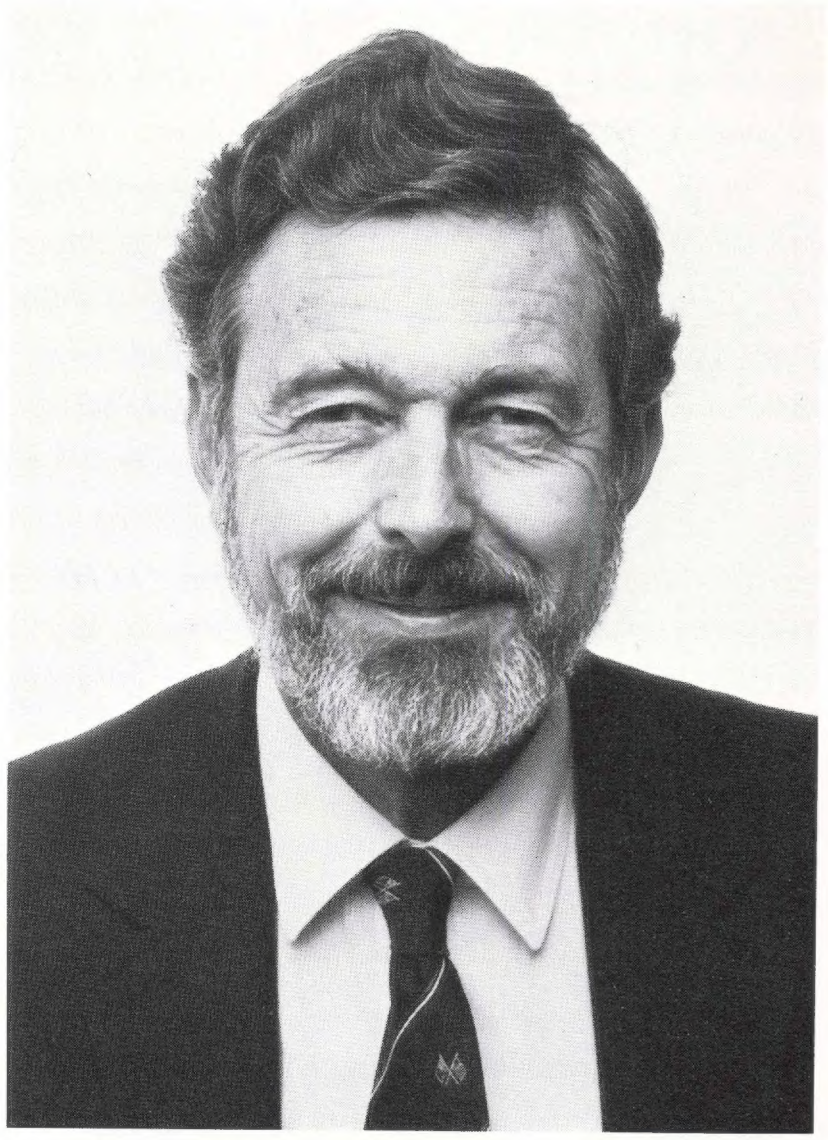
by museum designers Miles, Molinaroli and Frieberg from Washington, D.C.

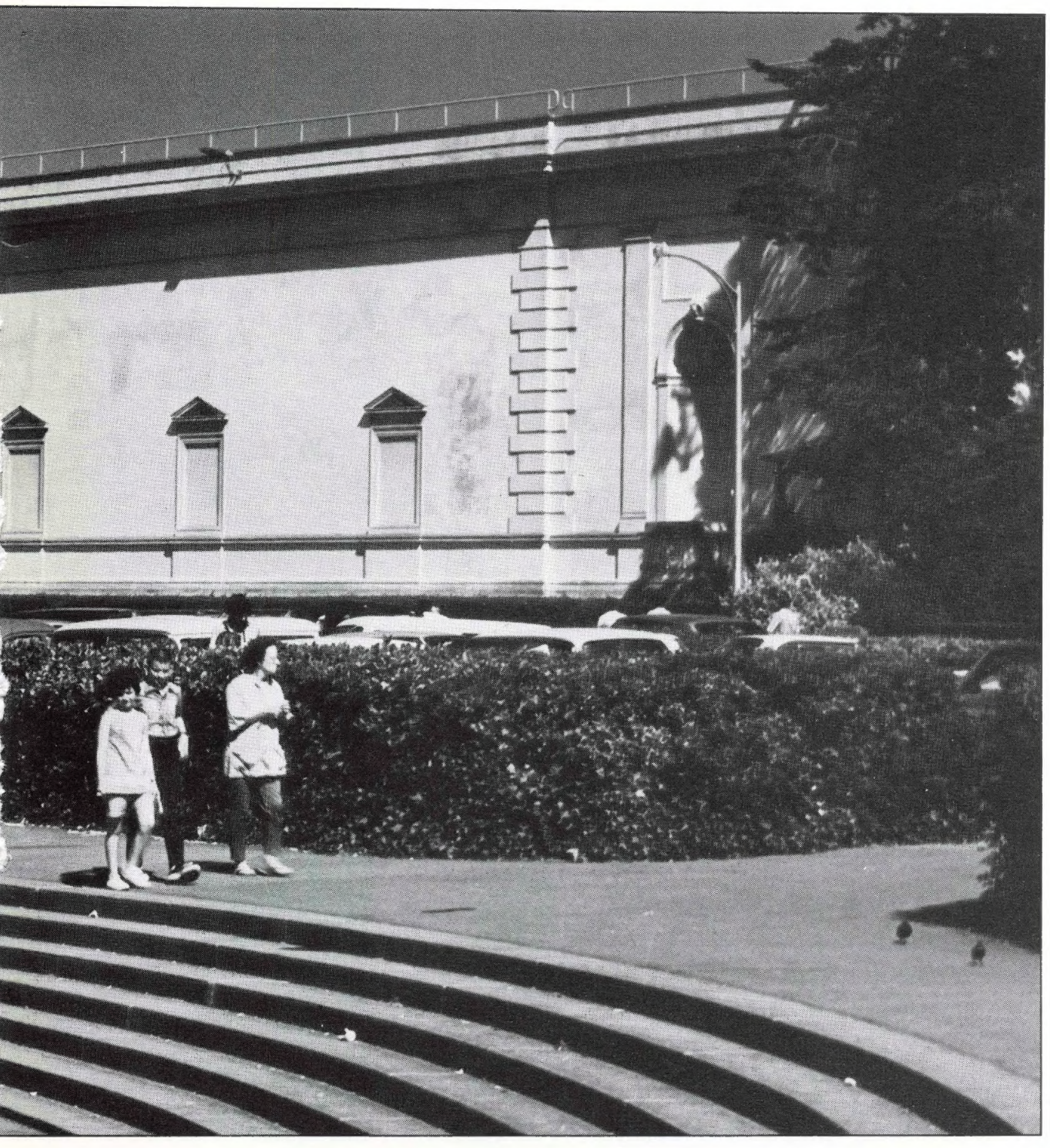
We enter the new year with some new goals. When attained they should help us to do better in our 130-year-old mission to learn more about the world and its plants and animals, and to share this fascinating knowledge with young and old. They involve new research, better work-space, renovated displays, more effective communication, and stronger educative programs. And perhaps a renewed sense of purpose in us all. The task now is to find ways to work toward our goals, and then to get support to reach them. Support of every kind will be needed.

We have had a great deal of help in the past year. Friends and benefactors, corporations, our strong army of docents and volunteers, the increasing membership, our trustees and fellows, and quite often members of the general public, have all combined to make this a successful year. When freshwater entered the Aquarium's saltwater system the city responded. The support of Mayor Feinstein, her staff and the supervisors has led to the intake being extended to restore excellent quality water. Mr. Lester Gunther, Sr. and his friends have provided us with the delightful penguin exhibit, and the Bothin Helping Fund supported a new trout exhibit. Major renovation of the Simson African Hall has been launched, being supported by Mrs. Paul L. Wattis.

We are very happy to have been joined by Mr. Charles Raaberg as Director of Development (previously with Brakely, John Price Jones), and Mr. Eugene Behlen as Director of Public Programs (previously with the Smithsonian Institution). This rounds out a talented team of senior administrative staff.

I can acknowledge with real pleasure that the Academy staff, at every level, produced both quantity and quality. You will see in the pages that follow that their hard work and dedication resulted in a lively and productive year. I believe you will be proud of their efforts.





Frank H. Talbot

FRANK H. TALBOT
Executive Director

AQUARIUM

John E. McCosker, *Director*

The Steinhart Aquarium's staff of biologists, engineers, and fabricators were kept busy with construction and development of several new exhibits. Steinhart visitors were treated for the first time to the delightful antics of penguins and the splendor of a fast-flowing high Sierrra trout stream. The Penguin Environment, designed and constructed by John Hewitt, is unique in its presentation of an entire community containing sixteen black-footed penguins, orchids, and a galaxy of colorful subtropical fishes and invertebrates. The exhibit was made possible by a gift from Lester Gunther, Sr., and its continuing support has been provided by a flock of local penguin-lovers.

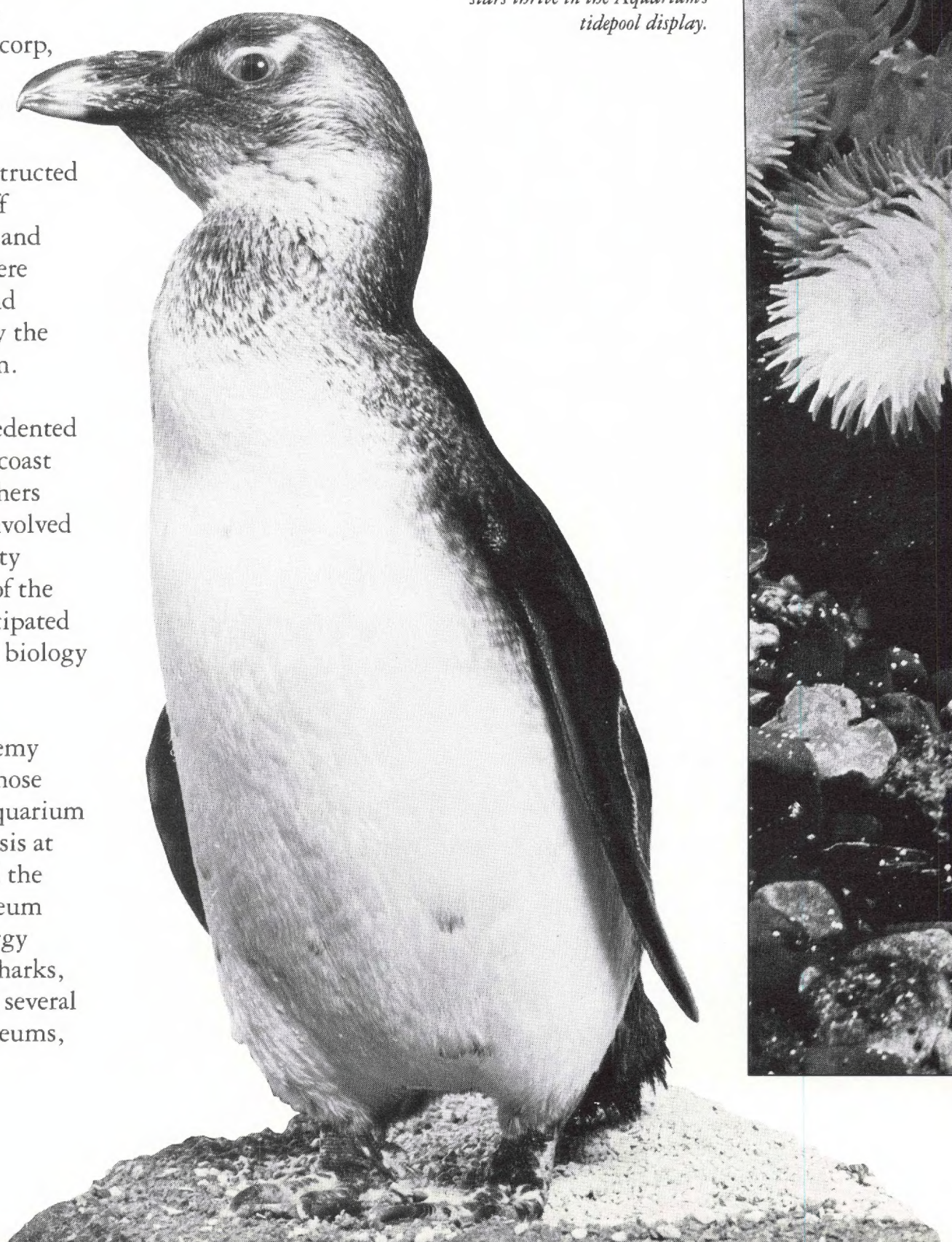
The Sierra trout stream, constructed by Jim Derzon and Richard Perloff, allows visitors a trout's eye view, above and below water, of a high mountain waterfall, a deep fishing hole, and a meandering spawning redd. Sponsored by grants from the Bothin Helping Fund and Pacific Telephone and Telegraph, this exhibit contains not only several kinds of trout, but also the colorful wildflowers, insects and birdlife of the habitat. Other new exhibits include the lookdowns, sponsored by Foster Bam and Citicorp, the chambered nautiluses, fluorescent corals, and the addition of new amphibians and their sounds to the swamp.

The beach water-pumping plant was reconstructed by the Ranney Company of Seattle and by staff engineers after suffering severe storm damage and sand transport problems. Emergency funds were made available by the City of San Francisco and technical expertise was generously supplied by the staff of the San Francisco Clean Water Program.

Sharks and the Aquarium were once again prominent in the Bay Area news. The unprecedented arrival of several great white sharks along the coast resulted in the closure of Stinson Beach to bathers over the Fourth of July weekend. Staff were involved in advising beach-goers, lifeguards, and county departments about the hazards and behavior of the sharks. Dr. McCosker and John Hewitt participated in an international symposium devoted to the biology of white sharks.

Various Aquarium research activities were streamlined through the creation of the Academy Department of Aquatic Research to include those activities involving live animals. Ongoing Aquarium research comprised: Sam Taylor's graduate thesis at the University of California, which concerned the educational graphics and the behavior of museum visitors; continuing studies of Aquarium energy management; and Dr. McCosker's studies of sharks, penguins, and eels. Dr. McCosker lectured at several American and European universities and museums, presented the commencement address at the

Above, at a black-tie opening dinner, Mr. Lester Gunther, Sr. and Mrs. Brayton Wilbur, Jr. visit a new resident of the Aquarium's Penguin Environment. Below, Ursula is just one of sixteen black-footed penguins drawing enthusiastic crowds to the new exhibit. Right, anemones and sea stars thrive in the Aquarium's tidepool display.



Lloyd Ullberg

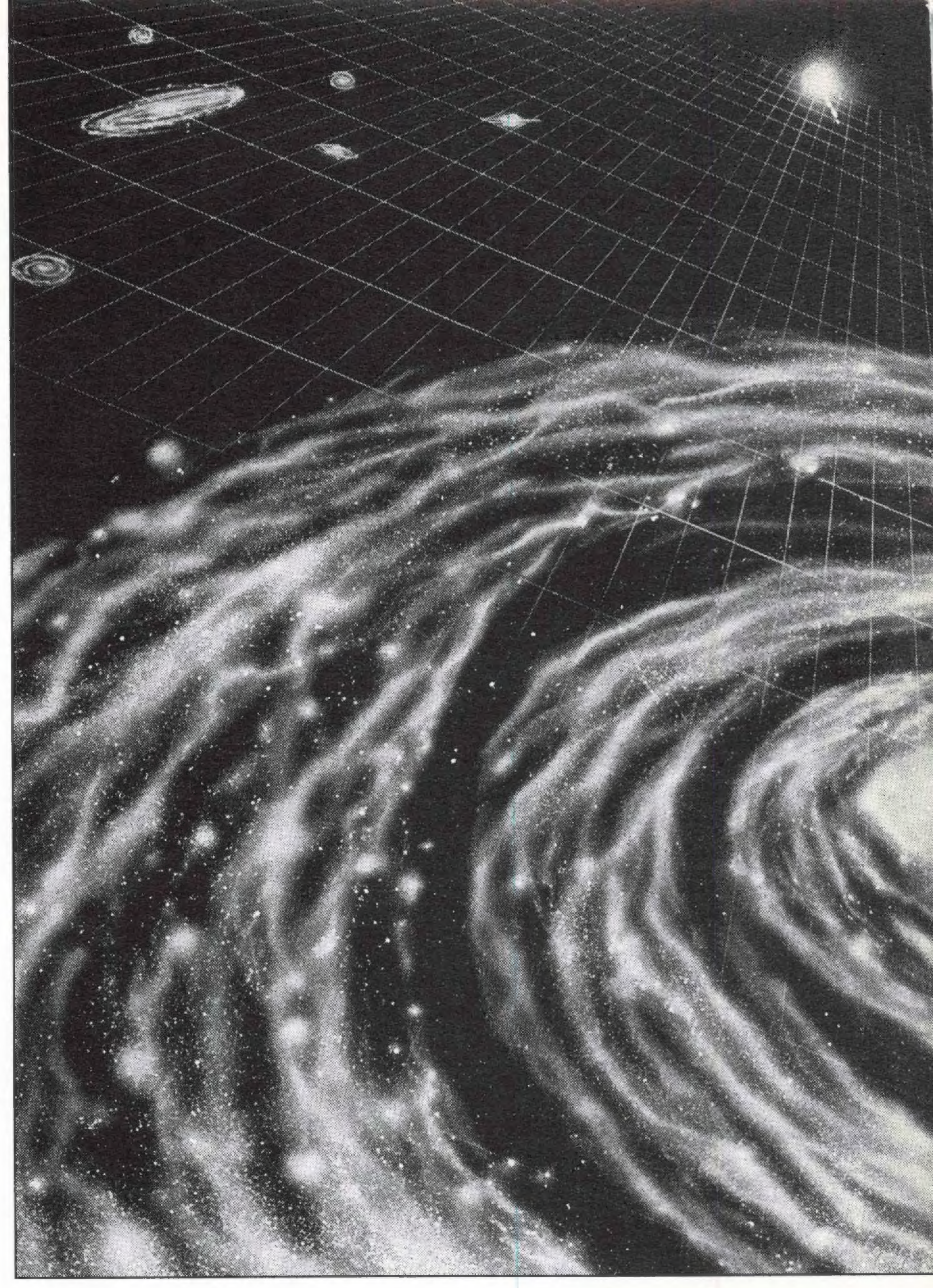
University of California, and is participating in the completion of the eel volume of the Fishes of the Western North Atlantic.

Tom Tucker represented the Aquarium at conferences of the American Association of Zoological Parks and Aquariums. Bruce Hiler joined Costa Rican and American biologists in an expedition to Central American rainforests.

Emeritus curator Robert Dempster continued his studies of fish parasites and filter efficiencies and is preparing a textbook on aquarium techniques.

Academy staff and friends were saddened by the tragic loss through accidental traffic deaths of Richard Lacer, staff herpetologist and artist, and Wilson Clark, research associate and energy advisor. Memorial funds were established in their names.

Substantial supplemental funding to the charter-required aquarium support by the City of San Francisco was provided by many individuals, including Mr. and Mrs. Jeffrey Meyer, Mr. Lester Gunther, Sr., Mr. Brayton Wilbur, Mrs. Marriner Eccles, Mr. George Lang, Mr. and Mrs. Edwin Janss, Mr. and Mrs. A. H. Brawner, and Mr. and Mrs. Robert Dunne Jr., Apple Computer Inc., and many other generous individuals and corporations.



Right, a stylized rendering of a spiral galaxy painted by staff artist Linda Grandke-Kulik to publicize the Planetarium's show Light at the Edge of the Universe. *Below, the Planetarium's sophisticated and durable star projector, built in the museum's own instrument shop between 1948 and 1952. This year Planetarium staff began a project to modernize and refurbish the delicate star plates used to project the image of the night sky.*

PUBLIC PROGRAMS

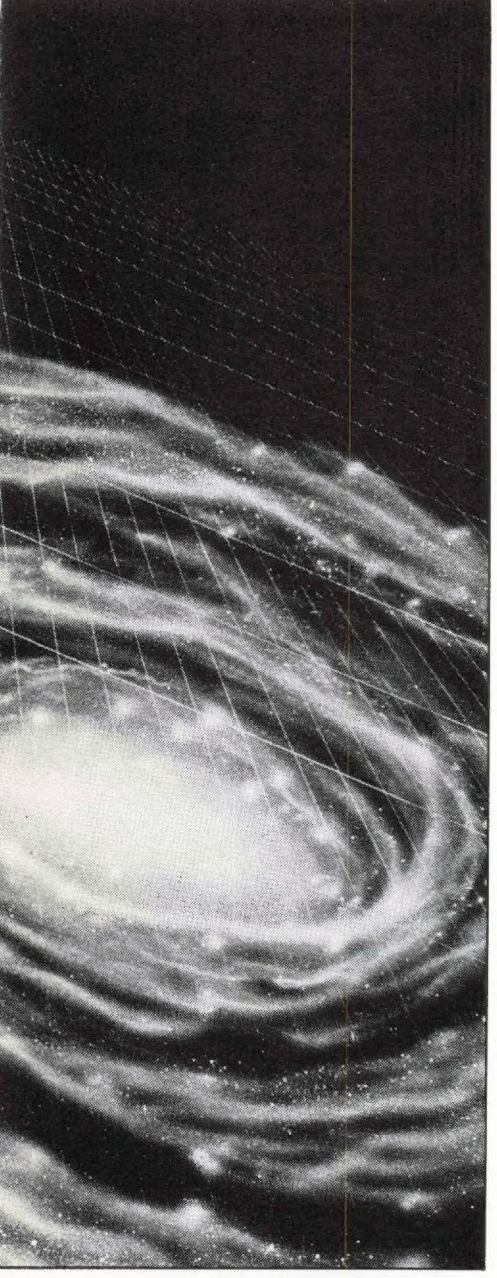
Planetarium

Lee W. Simon, *Acting Director*

In this thirtieth anniversary year for the Morrison Planetarium, five major presentations were offered to the public, three of which were produced in-house: "The Christmas Star," written by Walt Terris, and "Are We Alone?" and "Light at the Edge of the Universe," by Bing Quock. "Perplexities" and "Celestial Serendipity" were both purchased from the Strasenburgh Plantarium in Rochester, New York. Major themes included black holes, quasars, unexpected discoveries in astronomy, and the search for extraterrestrial life.

The 853 performances of these shows were attended by a total of 105,210 people. The special night-sky show, "Exploring the Skies of the Season," was offered 116 times during the year, and was attended by a total of 7404 paid visitors. Complimentary admissions (mainly Academy members) to all shows totalled 15,307.

Five special shows were offered for preschool and elementary school classes during the school year: "Magic Sky," from the Strasenburgh Planetarium, for preschool, kindergarten, and first grade; "Starlight," produced in-house, for first through third grades; "Cosmic Neighborhood," also produced in-house, for fourth through sixth grades; and two participatory shows from the Lawrence Hall of Science, "Finding Your Star" and "Red Planet Mars." The 122 performances were attended by 21,738 visitors.



After two-and-a-half years, the multimedia presentations by Eye See the Light Show ended their engagement and were replaced in December by the return of Laserium. Produced by Laser Images, Inc. of Van Nuys, Laserium shows offered included "Crystal Odyssey—a Classical Fantasy," "Laserium Presents the Who," "LaserRush," and "Laserium Presents the Beatles." During the entire year, 56,214 attended 618 light show performances.

Special presentations were made available to groups from IBM and the Association for Multi-Image, and the Planetarium was used as a backdrop in the filming of several television projects: a KPIX special on UFOs and "The Scheme of Things," a science show on the new Disney cable-TV channel.

As usual, the Planetarium received hundreds of phone calls and staff made numerous media appearances about the year's astronomical events, including the Perseid meteor shower, July's and December's spectacular lunar eclipses, comets IRAS-Araki-Alcock and Sugano-Saigusa-Fujikawa, and the flight of Pioneer 10 out of the solar system, among others. Planetarium staff were also involved in teaching several astronomy courses through the Education Department and the Junior Academy. In May, the staff obtained an Apollo lunar specimen from NASA for temporary display during the Academy's Open House for Members. Dr. Simon participated in a seminar program in June with other noted astronomers to study a total solar eclipse from Indonesia and to present lectures on astronomy.

Last year also saw the departure of Ken Wilson, Assistant Supervisor for five years, who accepted an invitation to join the staff of the new Universe Planetarium at the Science Museum of Virginia in Richmond. Linda Grandke-Kulik rejoined the staff as Artist and Photographer, and Darryl Skrabak was added as an Assistant Technician.

Exhibits

Kevin O'Farrell, *Acting Chairman*

Leading off an exciting schedule of exhibits, a stunning installation celebrated 1,400 years of Muslim accomplishments in the arts and sciences. *The Heritage of Islam* featured singular objects from all over the world, spanning the seventh to the twentieth centuries and including the earliest books and instruments relating to remarkable advances in

astronomy and medicine. This major traveling exhibit was conceived and organized by The National Committee to Honor the Fourteenth Centennial of Islam to increase American understanding of one of the world's most important religions.

Crossroads of the Ancient World: Israel's Archaeological Heritage, the magnificent product of the combined talents of the Academy and the San Francisco Fine Arts Museums, was inspired by a concept originating in the office of Mayor Dianne Feinstein. Rare artifacts from marine and land excavations at the seaport city of Haifa represent 2,000 years of history influenced by continuous trade with diverse civilizations. Curated by Ms. Renee Dreyfus of the M. H. de Young Memorial Museum, the exhibition was sponsored by the Sister Cities Committees of San Francisco and Haifa.

The Photography of Imogen Cunningham: A Centennial Selection, an unprecedented survey of the work of this celebrated artist, began a national tour at the Academy. Organized by the American Federation of Arts under the curatorship of Leland Rice and Susan Ehrens, this retrospective featured many vintage prints never before exhibited or published. Winning entries from the *Imogen Cunningham Photography Contest for Young People* created a delightful ancillary exhibit in the Buffet Gallery. *The Eye of Science* demonstrated how new technologies have extended the human eye's ability to see things previously invisible. Over 100 photographs expressing diverse techniques of image sensing emphasized the art to be found in research.

The Academy's commitment to ecology and conservation was evident in a tribute to a beautiful and threatened region of California: *At Mono Lake*, a selection of compelling images contributed by fifty-two American photographers, was made possible by grants from the National Endowment for the Arts, Polaroid Foundation, Friends of the Earth Foundation, Mono Lake Committee, and the Sierra Club Foundation. Tupper Ansel Blake's dazzling nature photography illustrated our rich wilderness heritage in an exhibit sponsored by the California Department of Fish and Game and the National Audubon Society. This exhibit, *The Wildlands and Wildlife of California*, acquainted viewers with the four major habitat regions and the fragile ecology of each.

In the People's Republic of China to study new and ancient techniques of aquaculture, John Galante recorded in *Images of China* the fascinating people and places encountered in regions seldom visited by Westerners. The Academy's Gem Room drew crowds of captivated viewers for *Fancy Colored Diamonds: The Rainbow Gem Collection*. A resplendent, 300-carat array of natural colored diamonds, the world's largest collection, was lent by Mr. Eddy Elzas.

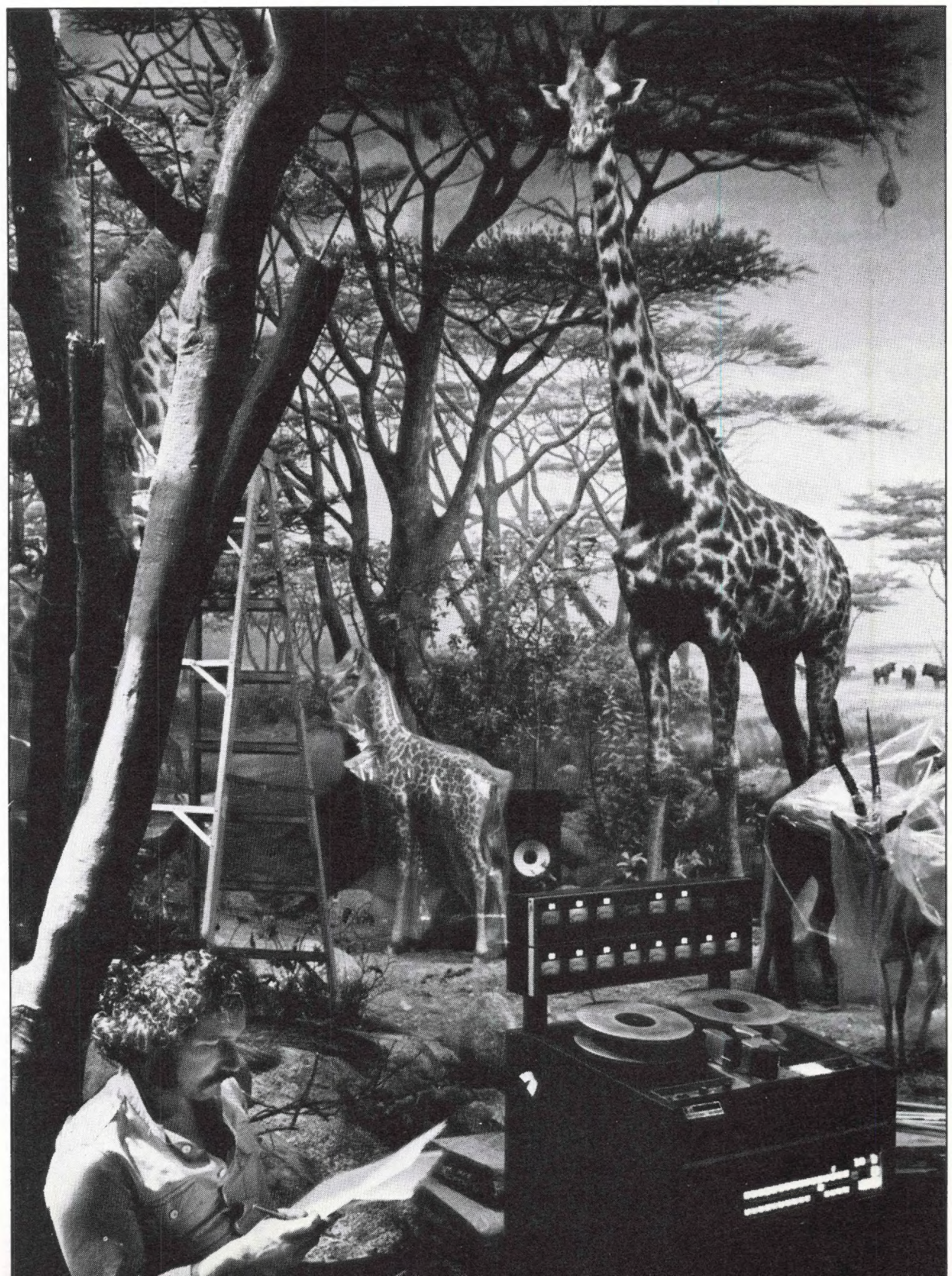
Blue Water Plankton astonished visitors with photographs of UFOS—unfamiliar fauna of the open sea (tiny, often transparent creatures which are the basis of marine life)—by Jonathan Trent and his friends. Lovell and Libby Langstroth documented their aquatic explorations with *Under Monterey Bay*, capturing the profusion of life and color beneath the water's surface.

Scores of artists collaborated to create *The Quilt*, displayed in tribute to the important rescue work of the California Marine Mammal Center; *The Great Whale Exhibition*, produced in concert with the Vorpal Gallery and the Olema Inn, raised capital for the Academy's Marine Mammal Fund; artifacts of food technology from our Rietz Collection enhanced the symposium *Bay Area Culinary Traditions*.

Over a million New Yorkers experienced *Exploring the Deep Frontier* while our traveling exhibit sparkled in the Roosevelt Rotunda of the American Museum of Natural History. The colorful Corn Dance, part of *Hopi Kachina: Spirit of Life*, was enjoyed by Academy visitors following the exhibit's successful national tour.

Work also began on the Waterhole Group in Simson African Hall, a project that has brought the thirsty flora and fauna of the savannah (including many new specimens) out from behind the glass to confront museum-goers.

Invited by John F. Kennedy University, Kevin O'Farrell completed a lecture series for their graduate program in Museum Studies; he also lectured on exhibition design at Nevada State University.



Academy exhibits staff brought to life the dramatic African Waterhole diorama by removing the covering glass panels (at right), building the exhibit out into Simson African Hall, and by incorporating a day-to-night cycle of light and sound that includes field recordings of animals at a natural waterhole in Africa—being sound-checked by Kevin O'Farrell (below). Facing page, an ancient sculpture from the special exhibit Crossroads of the Ancient World: Israel's Archaeological Heritage.

O'Farrell consulted on the masterplan redesign of the Waikiki Aquarium in Honolulu and on the development of *Hale Pai*, an historical museum in Lahaina, Hawaii. He also sat on a panel with two other designers, at the request of Artists in Print, to address the topic "Display and Exhibition Design."

Education

Susan Douglas, *Chairman*

The Education Department includes the Docent Council, the Junior Academy, the Discovery Room, Adult Education and Travel and the Office of Volunteer Services.

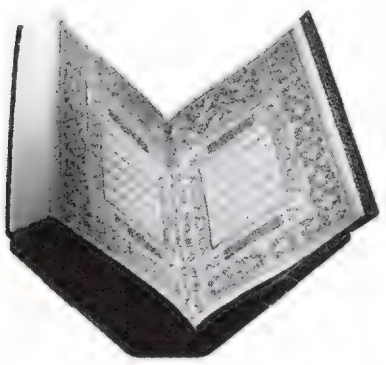
A first-time event for the Academy was the "Imogen Cunningham Photography Contest for Young People." Over 500 entries were submitted by young people of ages from four to eighteen. The winning photographs were displayed in the Buffet and received extensive coverage from the news media.

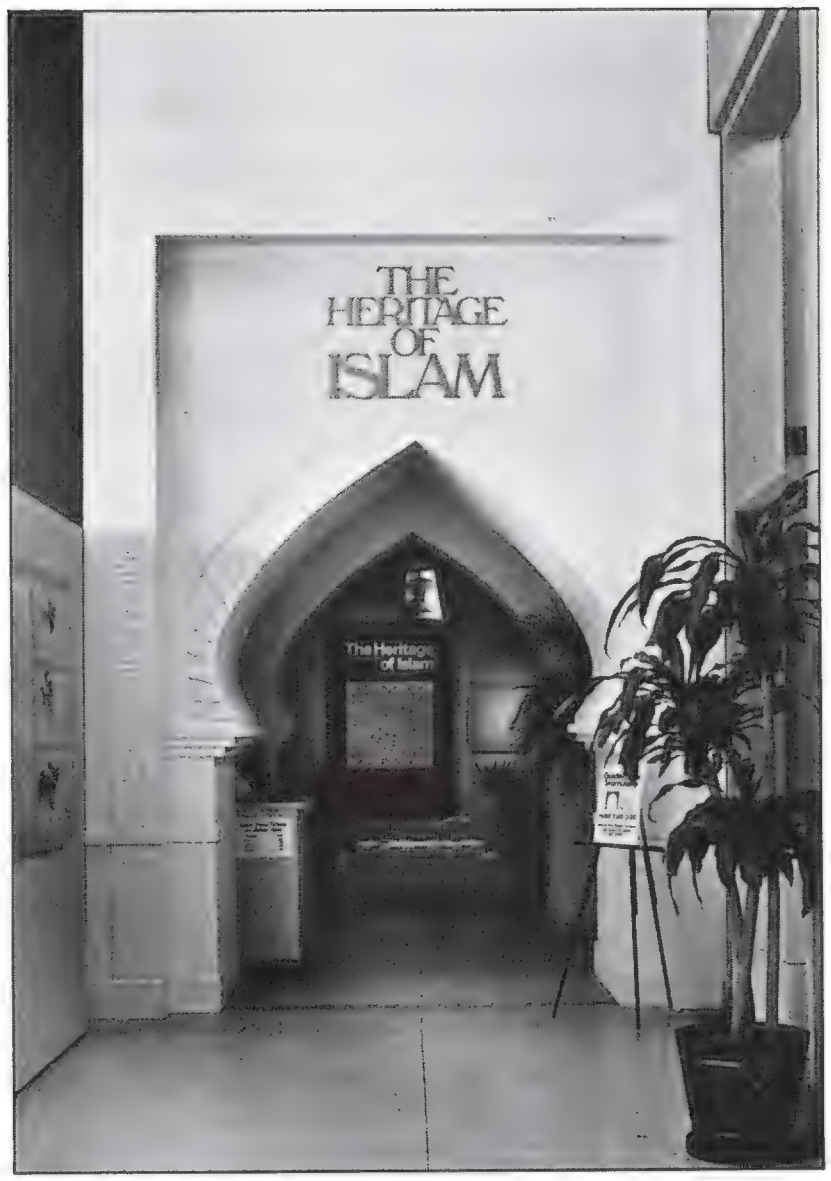
The "Pet Parade," with education about pets as the theme, was the Academy's activity for Museum Sunday, 8 May. A poster contest, plus demonstrations about pet animals and other pet-related happenings, was held throughout the day. Museum Sunday was a cooperative effort of cultural institutions in the Bay Area.

"Brownie Day" on 16 April, drew over 900 members of the Bay Area Girl Scout Council for a day of viewing the Aquarium, Wattis Hall of Man, and North American Hall of Mammals.

Mrs. Douglas was named a Fellow of the Kellogg Foundation Fellowship Program at the Field Museum of Natural History in Chicago. Participation in this program included a week-long series of meetings with other museum educators considering effective strategies for programming.

Right and below, a diverse, world-wide collection of Islamic art— The Heritage of Islam—*was one of several special exhibits displayed in the museum during the year.*





Mrs. Douglas attended the Museum Educators conference held in Washington, D.C., by the American Association of Museums. The conference was a meeting of an international group of museum educators and addressed the topic "Coping with Cultural Diversity and New Audiences."

JUNIOR ACADEMY. Susan Douglas, *Supervisor.* The Junior Academy program provides quality activities in natural sciences for young people from six to sixteen. Seventy-one classes were offered covering a wide range of topics including reptiles, birds, nature photography, volcanoes and earthquakes, anthropology, and dolphins and whales. The Junior Academy students participated in twenty-three field trips and special activities throughout the year. "Tidepooling at Pigeon Point" combined evening and early morning tidepooling with staying at Pigeon Point Youth Hostel and its historic lighthouse. A four-day camp-out at Pepperwood Ranch Natural Preserve gave youngsters an in-depth look at the ecology of the coastal range. Field trips to study elephant seals, wildflowers and photography were just a few of the single-day trips made possible through the use of the Junior Academy van. There were 989 Junior Academy members at the end of the report period, compared with 812 the previous year.

Above, San Francisco Mayor Dianne Feinstein joins Director Dr. Frank Talbot at the opening of the special exhibit Crossroads of the Ancient World, *which originated in Haifa, San Francisco's sister city in Israel.*

Robert Orr

VOLUNTEER SERVICES. Diane Butler, *Coordinator*. At the beginning of this year, management of the many dedicated volunteers serving throughout the Academy was restructured as a cohesive unit of docents, public area, research department and administrative volunteers. The result has been a more efficient process of selection, placement, and recognition of this important segment of the Academy's work force.

These 460 volunteers contributed nearly 45,000 hours in their duties cataloging archival material, preparing specimens, "walking" a shark, entering computer data, or cleaning bird cages. These essential, although sometimes tedious chores allow the scientific staff more valuable time to engage in scientific research.

In the public areas volunteers are to be seen everywhere, assisting members and the public to enjoy the Academy to the fullest. They represent the Academy to these visitors and can make a lasting impression about the institution and its services.

Information Desk volunteers serve daily at their Cowell Hall station where they answer questions about the museum, the park, and the city; sell memberships, maps, and magazines; and perform the important task of issuing security tags to those persons with business in non-public areas of the museum and aquarium buildings.

Many volunteers are trained to serve as tidepool educators at this popular exhibit in the Aquarium. Besides helping to explain the intertidal ecosystem to hundreds of thousands of visitors and supervising the handling of certain animals, these volunteers also assist the professional staff with feeding and cleaning at the tidepool and other areas of the Aquarium.

DISCOVERY ROOM. More than thirty Discovery Guides joined the Academy in mourning the loss this year, at the age of ninety of Janet Nickelsburg, the Discovery Room's inspiration and benefactor. In excess of 60,000 children and adults found delight in exploring this opportunity to learn by sight, sound and touch, of the joy and wonder to be found in nature. The continuing support of volunteers ensures that this legacy Mrs. Nickelsburg has left in the Academy's care will enrich the lives of future generations.

SPECIAL EVENTS. A significant number of volunteers give up their evenings and weekends to help the Academy by providing assistance and hospitality at membership events such as exhibit openings and Members' Open House Events. To prove that volunteers are willing to try anything, several took turns wearing a very warm penguin

Robert Orr

Far left, museum members identify the day's finds during Dr. Robert Orr's popular Mendocino Mushrooming *trip offered by Adult Education. Academy Expeditions took members on adventures from California to Africa, and from South America to Alaska (left).*

Above, a larger-than-life talking penguin performed for visitors on the new Penguin Environment's opening day. Left, young participants in Junior Academy classes have the opportunity for direct contact with exotic animals, such as this large tropical iguana.

costume to hand out ballons at the public unveiling of the new Penguin Environment in the Aquarium. The Academy's visitor survey is an on-going volunteer project to collect information exhibit area preferences, preferred media sources, and demographic data from Academy visitors.

DOCENT COUNCIL. Judy Prokupek, *Chairman*. The largest and most highly trained group of volunteers is the Docent Council, with 160 members serving the Academy and the community. The primary mission for these volunteers is to provide instruction and generate enthusiasm among students for the Academy and the natural world. Nearly 30,000 students and their teachers benefited through museum and classroom presentations by these volunteer educators.

Docents began the year with training for tours in the Heritage of Islam exhibit, joined by some

associates from the Asian Art Museum. Workshops and enrichment activities such as field trips and lectures provided continuing education for Docent Council members. A major training course in anthropology produced an additional forty persons qualified to lead tours in the Wattis Hall of Man. Docents also answered the call for volunteers to assist in several Academy events such as Open House Evenings, exhibit openings and members events.

Since early spring the Council has been seeking new members to participate in its basic course. Trainees will begin touring during the peak spring season, in North American Hall and the newly refurbished African hall.

A hard-working docent committee produced classroom activity packets for pre-tour and post-visit use. These supplement the successful Teachers' Resource Guide to the Academy funded by the First Interstate Bank of California Foundation. Docents will also assist teachers through workshops and curriculum development and will continue to promote the Academy in the public sector.

In appreciation of these considerable efforts, the Academy honored its entire volunteer corps at a buffet luncheon during national Volunteer Week. Dr. Talbot and Department representatives welcomed the nearly 300 persons who attended, and extended their gratitude on behalf of the entire Academy. An honor roll of Academy volunteers appears on pages 32 and 33. Each one has contributed to the Academy's accomplishments this year, and we acknowledge one and all with gratitude.

ADULT EDUCATION AND TRAVEL. Sandra Lelich and Carol Prince, *Coordinators*. Thirty-eight courses on a variety of subjects from California maritime archaeology to the art of papermaking were enjoyed by 876 members. There were fifteen special lectures presented free of charge to members and their guests, in addition to the regular monthly members meetings.

A total of fifty study tours involved 1,630 members on excursions ranging from half-day walks to four-day bus tours exploring the natural history of California. Five symposia and two special programs were offered in cooperation with other institutions and attracted large audiences. For example, 450 members and their guests enjoyed the two-day Bay Area Culinary Traditions Program featuring talks by authorities on all aspects of the culinary world and two evenings of food and wine tasting.

The international travel program offered twelve expeditions to areas as diverse as Antarctica, Ethiopia, and the Grand Canyon. Trips were led by Academy staff members and other experts in the field. Among them, Dr. Robert T. Orr led a safari to Australia, Dr. Robert Drewes led another through Kenya, and Antony Hutt, an expert on the Islamic world, guided a group through Spain and Morocco in conjunction with the exhibit "The Heritage Of Islam."

Photography

Susan Middleton, *Photographer*

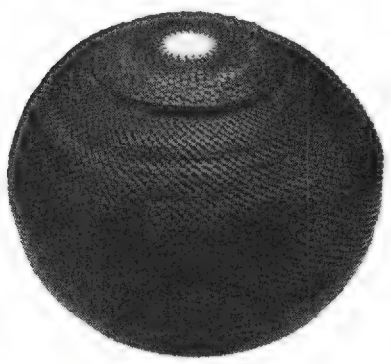
The Photography Department is a valuable resource to the entire Academy, offering professional photographic services to all departments. Black-and-white as well as color photographs are made in the studio and on location throughout the Academy in formats ranging from 35mm to a large process camera. All black-and-white processing and printing is done in the Photography studio.

Photographs are produced for numerous publications including exhibit catalogs, *Pacific Discovery*, the Annual Report, Development brochures, and scientific and popular publications. Two hundred artifacts from the Elkus collection of Southwest native American silverwork, textiles, ceramics, and watercolor paintings were photographed for publication in an upcoming catalog.

Publicity photography for media distribution is essential to the promotion of the Academy, including photographing exhibit openings and special events. Scientific photography is provided for the research departments to illustrate specimens, and photographs are made for exhibits and the Aquarium. Graphic arts photography is produced for platemaking in the print shop and Aquarium signage. Judy Steiner is Photographic Assistant.

Below, as part of the Anthropology department's Rietz Food Technology Collection, these Japanese teapots were used as an insignia for the successful Bay Area Culinary Traditions Program.

RESEARCH



Anthropology

Robert H. Sayers, *Visiting Assistant Curator and Acting Chairman*

Dr. Dorothy K. Washburn, on an NSF-funded research leave through the year, continued work on two major projects—a *Handbook of Symmetry Analysis* in collaboration with mathematician Donald Crowe of the University of Wisconsin and a monograph on design symmetry in California Indian baskets—plus a paper on early dealers and collectors of ethnographic art.

Above, Dr. Robert Sayers with selections from the Anthropology department's Charles DeYoung Elkus collection of Southwestern ethnographic material. Numerous examples from this outstanding collection are on display in Wattis Gallery.

Dr. Washburn also served as Associate Program Editor for Archaeology at the Eighty-First Annual Meeting of the American Anthropological Association in Washington, D.C.; chaired sessions at the Mogollon Conference at New Mexico State University in October; and presented a paper, "Mathematical Analysis of Decorative Patterns," at the Annual Meeting of the Mathematical Association of America, Stanford University.

Dr. Robert H. Sayers, Visiting Assistant Curator and Acting Chairman, in addition to administrative duties and the teaching of the Wattis Hall of Man docent anthropology course, continued work on his second Smithsonian monograph, *The Korean Onggi Potter.* He also supervised the completion of the National Endowment for the Humanities–funded *Elkus Catalog*, a project begun by Dr. Washburn and staff. In June, Dr. Sayers secured a $15,000 National Endowment for the Arts grant to fund a year-long Saturday afternoon program of traditional performing, craft, and food arts in Wattis Hall. The department, through this program, seeks to recognize individuals and groups in Bay Area ethnic communities who are consciously preserving aspects of their traditional culture. Performances are being coordinated by June Anderson.

Research Archaeologist Dr. Diane Lee Carroll completed her initial analysis of the department's valuable Coptic textile collection and has been refunded by NEA to write a catalog: *Coptic Dress Ornaments in the Carl Austin Rietz Textile Collection*. During the year, three of Dr. Carroll's technical articles ("Warping the Greek Loom: A Second Method," "On Granulation in Ancient Metalwork," and "The Problem of the Coptic Loom") appeared in, or were accepted for publication in, *The American Journal of Archaeology*

Collections Manager Joan Bacharach (with assistance from Curatorial Assistant Terri Berman and volunteers Verdi Miller and Jim Patton) added a number of important objects to our ethnographic holdings. Especially notable was a donation of seventeen superb California and Southwestern Indian baskets from the T. B. Walker Foundation. Other donors of materials from the Americas, from Asia, and from the Pacific included: Mrs. Janet Aitken, Mr. and Mrs. Thomas Day, Mr. Steve Craig, Dr. William Eastman, Mr. Frederick A. Egersderff, Mrs. Jeanne G. Ferrari, Mr. L. K. Land, Ms. Denis Penley, Mrs. Rosebud Saunders, Dr. Victoria Selmier, Mr. George Swortfiguer and Mr. and Mrs. George Waters.

Ms. Bacharach also chaired two sessions on Disaster Planning at the Annual Meeting of the American Association of Museums in San Diego and convened a food history symposium ("Bay Area Culinary Traditions") at the Academy in May.

During the year, the department lent numerous specimens from its collections to other institutions and received scholars and museum professionals from such distant places as Belgium, Egypt, South Korea, Tanzania, and Thailand. In addition, we opened our doors to numerous collectors seeking to identify items in their personal collections.

Aquatic Biology

John E. McCosker, *Curator*

Research has always been an important complement to the display function of the Steinhart Aquarium. The Aquarium's immense water systems and technical support provide research opportunities unavailable to most universities and laboratories. To that end, the department of Aquatic Research was

Left, television's "Evening Magazine" host Richard Hart and Aquarium Director Dr. John McCosker explore a local tidepool during a special program on aquatic research at the Museum and Aquarium. Above, another special program put Richard Hart in the Aquarium's Fish Roundabout.

created this year to expand the use of the Aquarium facility by Academy staff and numerous research associates. All projects are either grant funded or supported by the researcher's home institution. Several projects are proceeding within the department.

Dr. Wayne Lanier has been studying the development of the fungus *Mycena citricolor*, a serious plant pathogen in Central America and of economic importance to the coffee industry. Results from his research have included isolation of a substance that inhibits fungal growth, and establishment of coordinate photoinduction of bioluminescence and the initial stage in development of the disease-spreading structures.

Dr. Michael D. Lagios of Children's Hospital, San Francisco, continued his studies of coelacanth relationships, anatomy, and physiology. Bill Merkel of P. G. & E. worked with the staff and the National Association of Corrosion Engineers to evaluate the response of sharks to weak electric fields.

Dr. Peter Ward, of UC Davis, and Christina Slager experimentally determined the buoyancy control mechanisms of chambered nautilus by fluctuating the amount and location of cameral liquid within their shells. They also discovered that nautilus grow more quickly than had previously been thought through the weekly radiographic examination of living display specimens.

Robert Dempster and William Rohrs, aquarium biologists, published the results of their studies on the spawning and larvae of lingcod in the Aquarium. Elizabeth Galbreath, San Francisco State University, in association with Drs. Hal Markowitz and Diana Reese, continued research on the Aquarium's Pacific white-sided dolphins. Concentrating on behavioral enrichment activities, these studies have generated significant data on the symbol discrimination abilities of dolphins.

Jeffery Baysa, of the UC Medical Center Immunology Department, and Pat Morales are currently engaged in research to ascertain if anaphylaxis can be induced in fish. Their preliminary results disagree with the "classical" interpretation and suggest that anaphylactic shock cannot be induced and that antibodies are not produced.

Dr. McCosker joined Dr. Leighton Taylor, University of Hawaii, and Al Giddings, Ocean Films, Ltd., in an expedition to South Australia to study the behavior of the great white shark. Sharks were filmed and tagged with electronic devices to establish their swimming speed, internal body temperature, and feeding behavior. Dr. McCosker completed a study with Dr. Francis Carey, Woods Hole Oceanographic Institute, that presented evidence that the salmon shark *Lamna ditropis* is capable of elevating its body temperature, thereby increasing its swimming and feeding efficiencies.

In the future the Aquatic Biology department hopes to expand by providing additional laboratory space for visiting and staff researchers.

Lloyd Ullberg

Botany

Frank Almeda, Jr., *Chairman and Associate Curator*
(McAllister Curatorial Chair of Botany)

The size of the herbarium was increased by some 15,000 specimens during the fiscal year. This brought our total holdings to approximately 1,505,000 mounted specimens. Much of the newly acquired material was from Mexico and Central America. Other significant accessions included plants from California and the western United States and China. The Botany Department lent a total of 13,306 specimens in 94 transactions to professional scientists and graduate students at foreign and domestic institutions. During the year the department welcomed 380 professional scientists and graduate students who came to study specimens or consult our holdings of botanical literature. In addition a total of twenty-six tour groups from colleges, universities, and special interest groups visited the department. Staff also answered more than 300 inquiries from physicians, regional poison centers, state, federal, and private agencies.

The National Science Foundation provided $44,920 for salaries of two curatorial assistants to complete integration of the Dudley Herbarium.

Dr. Almeda's research continued to focus on the Mesoamerican Melastomataceae with emphasis on the species of Chiapas, Mexico. Preparation of a comprehensive treatment of the family for the *Flora of Chiapas* necessitated study visits to several herbaria in the eastern United States. He also continued his work on chromosomal cytology and scanning electron microscope studies of seed morphology of the berry-fruited neotropical Melastomataceae.

Dr. Dennis E. Breedlove spent the year processing and determining his collections from the last two years' fieldwork. He has made preliminary determinations on 10,000 of the 15,000 specimens collected in Chiapas, Mexico. In preparation of manuscripts for the *Flora of Chiapas* he made two week-long trips to the University of California, Santa Barbara to study oaks. He was elected to the board of directors of the Strybing Arboretum Society.

Dr. Alva Day continued to devote much of her time to the integration of the herbarium collections and supervision of this effort. In May her research on *Gilia* took her to northern Arizona and New Mexico where collections of several poorly known species were obtained for study and chromosome number determinations.

Bruce Bartholomew was appointed Collection Manager in October. This position is new in the Botany Department and replaces and upgrades the position of Senior Curatorial Assistant formerly held by Barbara Keller. Dr. Bartholomew has also been involved in segregating out many type-specimens from the general collection in preparation of a project to microfiche our 10,000-specimen type collection. Dr. Bartholomew received a National Geographic Grant of $22,369 for support of a joint U.S.-Chinese plant collecting expedition to Sichuan Province in the People's Republic of China. This expedition will also involve the Arnold Arboretum of Harvard University, the Missouri Botanical Garden, the Beijing Institute of Botany, and the Chengdu Institute of Biology.

Mr. John Thomas Howell continued to make progress with his floras of the Sierra Nevada and of the Central Valley of California. He continues work on treatments for the Compositae and Leguminosae and has collected many additional specimens in the course of field work in diverse areas of California.

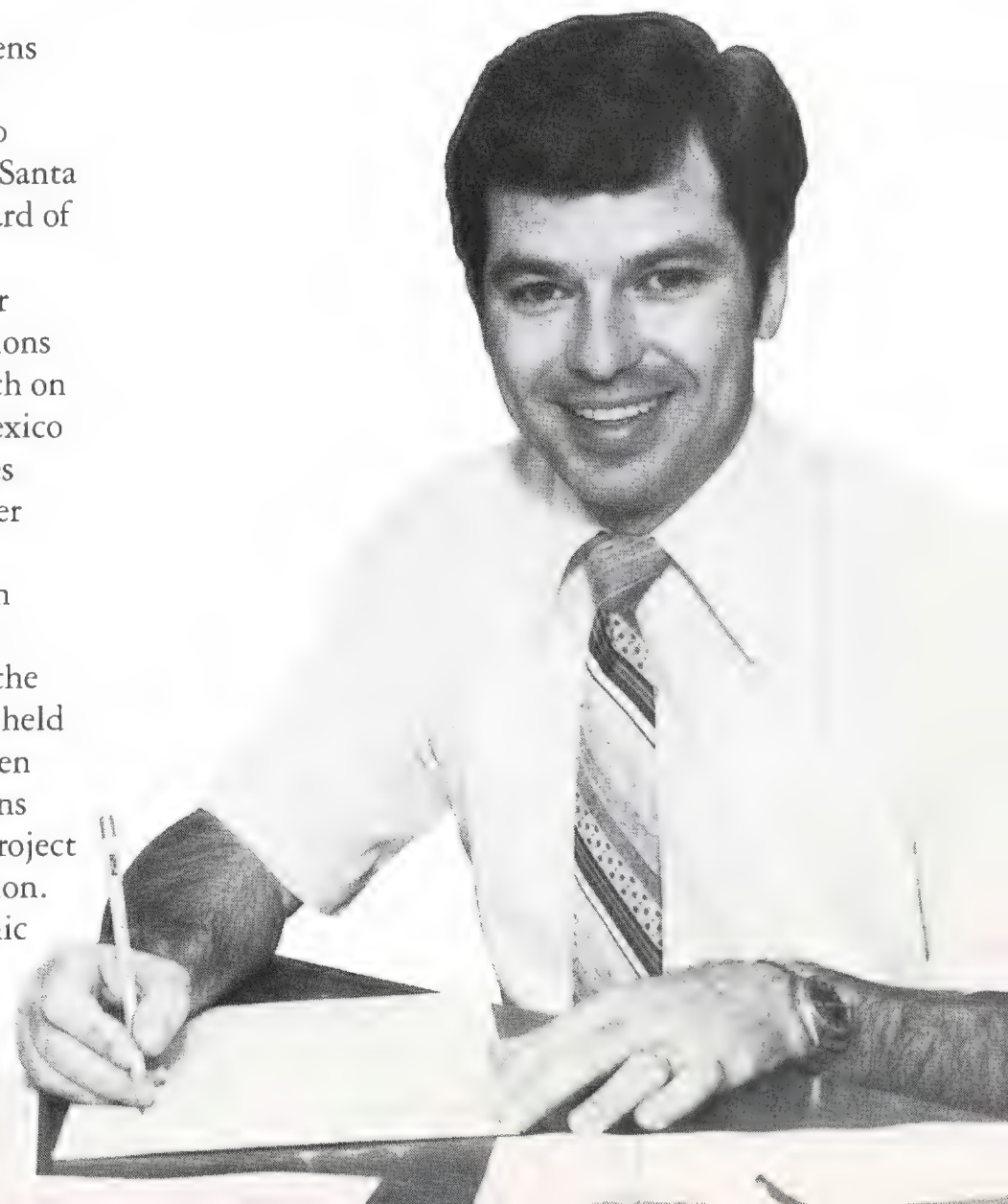
Dr. Sylvia A. Earle continued her role in encouraging proper utilization of ocean resources as a member of the council for World Wildlife Fund International a trustee of the Charles A. Lindbergh Fund and as a member of the President's National Advisory Committee on Oceans and Atmosphere.

Anita M. Noldeke died on 1 January 1983. A long-time friend of Alice Eastwood and member of the California Botanical Club, she became a volunteer in the Botany Department in 1956 when she moved from Sonoma County to San Francisco. She became a member of the staff in 1958. Her helpful, friendly, and gracious presence is missed by all who knew her.

Entomology

Wojciech J. Pulawski,
Chairman and Assistant Curator

The collection of insects and arachnids presently contains about 7,185,100 processed specimens, including 112,931 which were processed and added during the past year. These represent contributions from 161 separate sources (individuals, institutions, or expeditions).



Above, the plants of Golden Gate Park surround the museum and aquarium with a living display of exotic species. Right, Dr. Frank Almeda continues work on his comprehensive treatment of Costa Rican plants in the family Melastomataceae.

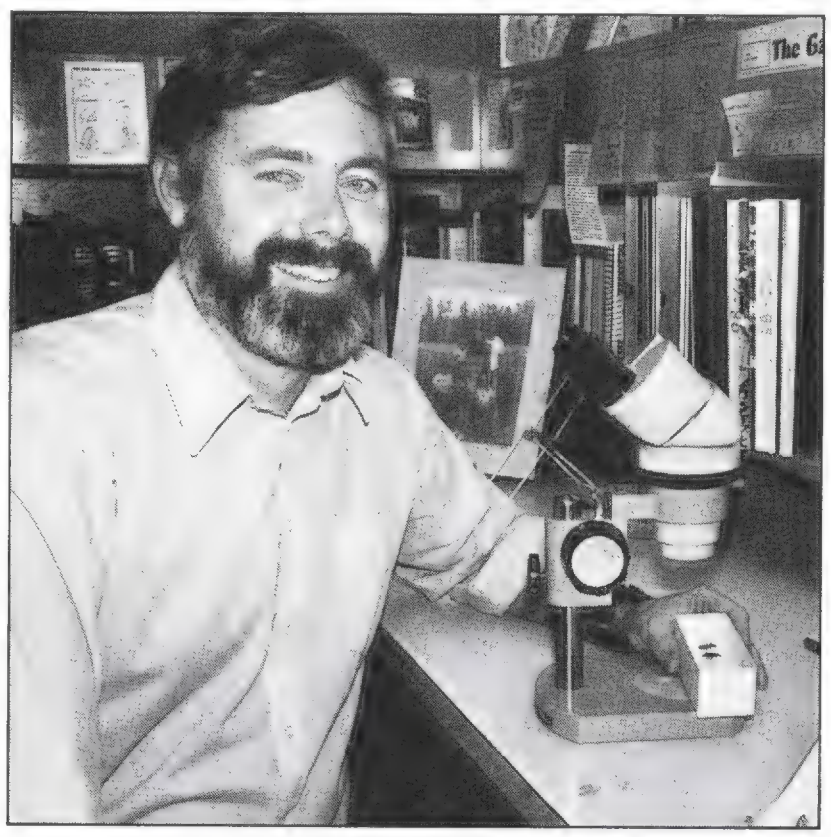
During the year, the National Science Foundation provided $70,000 for the care and use of the systematic collections of the Entomology Department, specifically for salaries of technical assistants and for supplies.

Dr. Arnaud continued his research on the Nearctic Thaumaleidae (Diptera) and was working on editing and production of a festschrift volume on Tabanidae honoring Dr. Cornelius B. Philip. A manuscript on an exotic thrips (*Cartomothrips* sp.) adventive to California was accepted for publication in the *Proceedings of the Entomological Society of Washington*. Dr. Briggs worked toward completion of California cave fauna, especially arthropods, and (with Darrell Ubick) continued with his work on laniatorid harvestmen taxonomy. Ms. Hunter reviewed populations of *Carabus taedatus* (geographic variation in isolated populations). Dr. Kavanaugh continued his monographic study of the Nearctic species of *Nebria* and expanded his study of the carabid beetles of the Pacific Northwest coast. Mr. Lee continued his studies of sand dune and sea beach arthropods. Dr. Philip continued his studies on neotropical and Oriental horse flies. Dr. Pulawski made progress on his monograph of North American *Tachysphex* wasps and completed a revision of three hitherto confused Palearctic *Trypoxylon* wasps. Dr. Ross continued his work on a monograph of the insect order Embiidina. Dr. Smith continued on the Atlas of Insect Anatomy, including other arthropods. Dr. Weissman revised the field crickets (genus *Gryllus*) of North America west of the Mississippi, the Jerusalem crickets (genus *Stenopelmatus*) north of Mexico, and Orthoptera of Baja California, especially Decticinae katydids and mogoplistine crickets. Dr. Williams continued his work on the scorpions of western North America, especially of California.

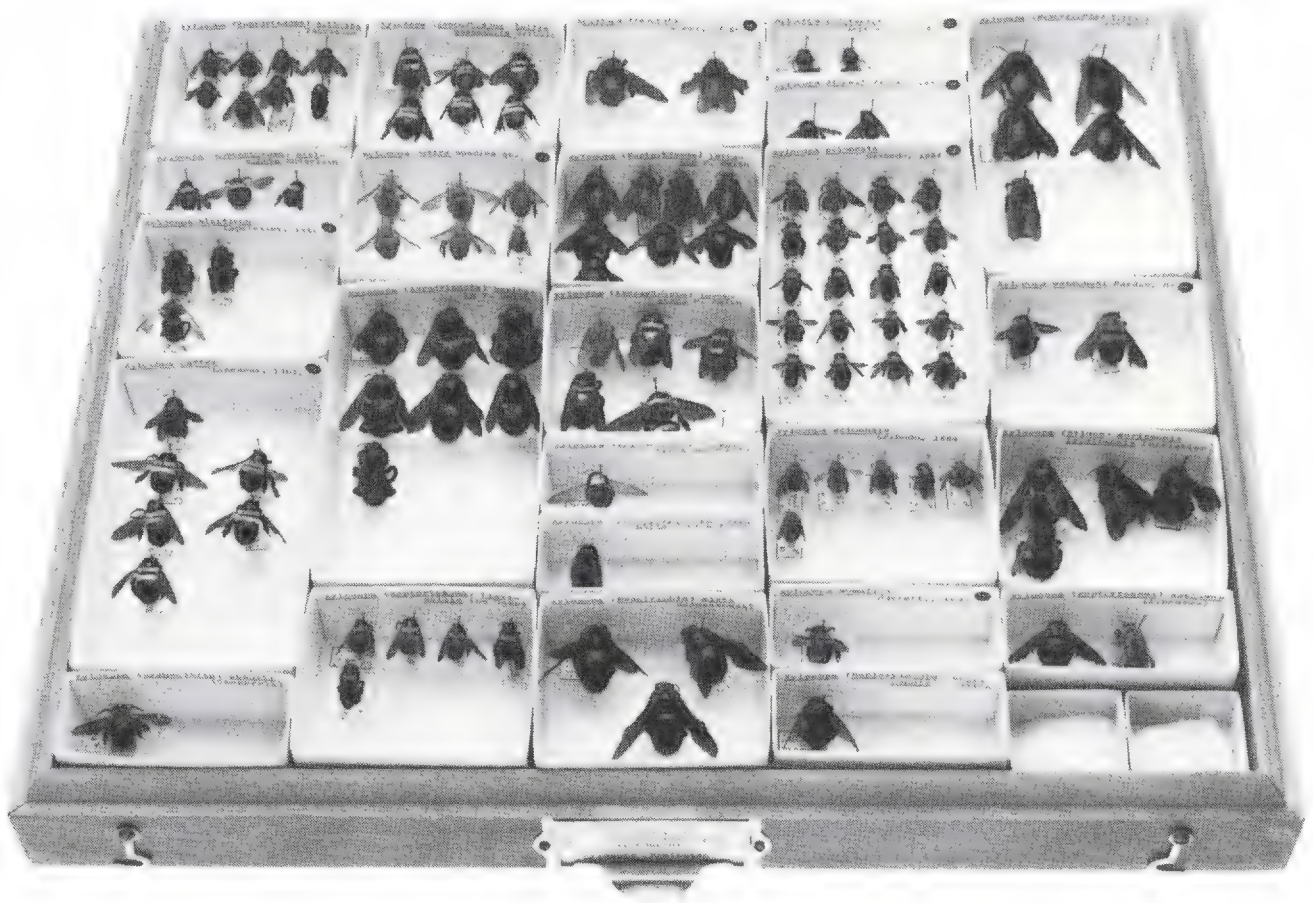
A grant from National Science Foundation of $81,219 was received for purchasing a scanning electron microscope, and an additional fund of $10,015 was assigned by the Academy Director for accessories. The Exline-Frizzell Fund for Arachnological Research was approved by the Academy director for grants-in-aid. Mr. Fisher was awarded a $500 University of California Chancellor's Patent Fund Grant. Dr. Weissman received $4,150 from the National Geographic Society for his study of Orthoptera of Baja California.

In the field, Dr. Arnaud visited eastern U.S. and Canadian museums containing collections of *Hilara* during the summer of 1982. Dr. Briggs collected extensively in California caves and in Bay Area serpentine habitats. Mr. Fisher made a ten-day trip through northern California to study the life history of a new robber fly species; he also made numerous shorter trips to southern California and Arizona. Ms. Hunter made numerous collecting trips to the northern Sierra Nevada. Dr. Kavanaugh conducted field studies in the Strawberry, Wallowa, and Steens Mountains of eastern Oregon and in the Trinity Alps and Warner Mountains of northern California. Mr. Lee made field studies at various sand dune and beach localities and also serpentine areas in California. Dr. Pulawski made numerous collecting trips in San Francisco Bay Area, as well as trips to the Southwest and to southwestern California. Dr. Ross collected insects in southeastern Arizona, western Great Plains and Montana, and in the Amazon Basin of the Madre de Dios and Iquitos regions of Peru. Mr. Ubick observed and sampled arachnids (mainly spiders) in various natural parks and reserves of Costa Rica.

A total of 75,692 specimens were lent to 179 individuals in 260 separate transactions during the year. Loan recipients represented all parts of the United States (202 workers) and 18 foreign countries on six continents. The Department received 1,710 visitors, including 380 visitor days by professional entomologists, 136 by graduate students, 20 by undergraduate or high school students, and 1,174 by



Left, Dr. David Kavanaugh, a specialist in arctic and montane ground beetles, is continuing his work for a monograph on the beetle genus Nebria. *Below, carefully preserved and labeled carpenter bees exemplify the Entomology department's collections, which include more than 7 million specimens.*



others who came as individuals or in groups to use our facilities.

Dr. Kavanaugh presented lectures for the California Academy of Sciences–San Francisco State University Graduate Seminar Series in Systematics, the University of Nevada, Reno, and Oregon State University, Corvallis. He was also co-organizer of a symposium entitled "Origins of the North American Insect Fauna," held in Toronto, Ontario, and presented a paper in the symposium.

Herpetology

Robert C. Drewes,
Chairman and Assistant Curator

During 1982-83 approximately 1,715 specimens were added to the department's holdings. Our collections are ranked fourth in the Western Hemisphere and are recognized as a major international resource. The most significant accessions were large collections of amphibians from Kenya collected by Research Associate Dr. Mills Tandy and Field Associate Leo Hoevers, and specimens from Costa Rica collected by Bruce Hiler of Steinhart Aquarium. Other important collections were received from the Philippines, Fiji, Mexico, Puerto Rico, and Ghana.

The Department continued service to the academic community; 57 loan requests involving 1,565 specimens received response, and a total of 143 loan transactions were made of 4,626 specimens. In all, informational requests involving over 15,000 specimens were answered during the year. Over 130 visitors used the collections, and thirty-one scientific papers were published based on our material.

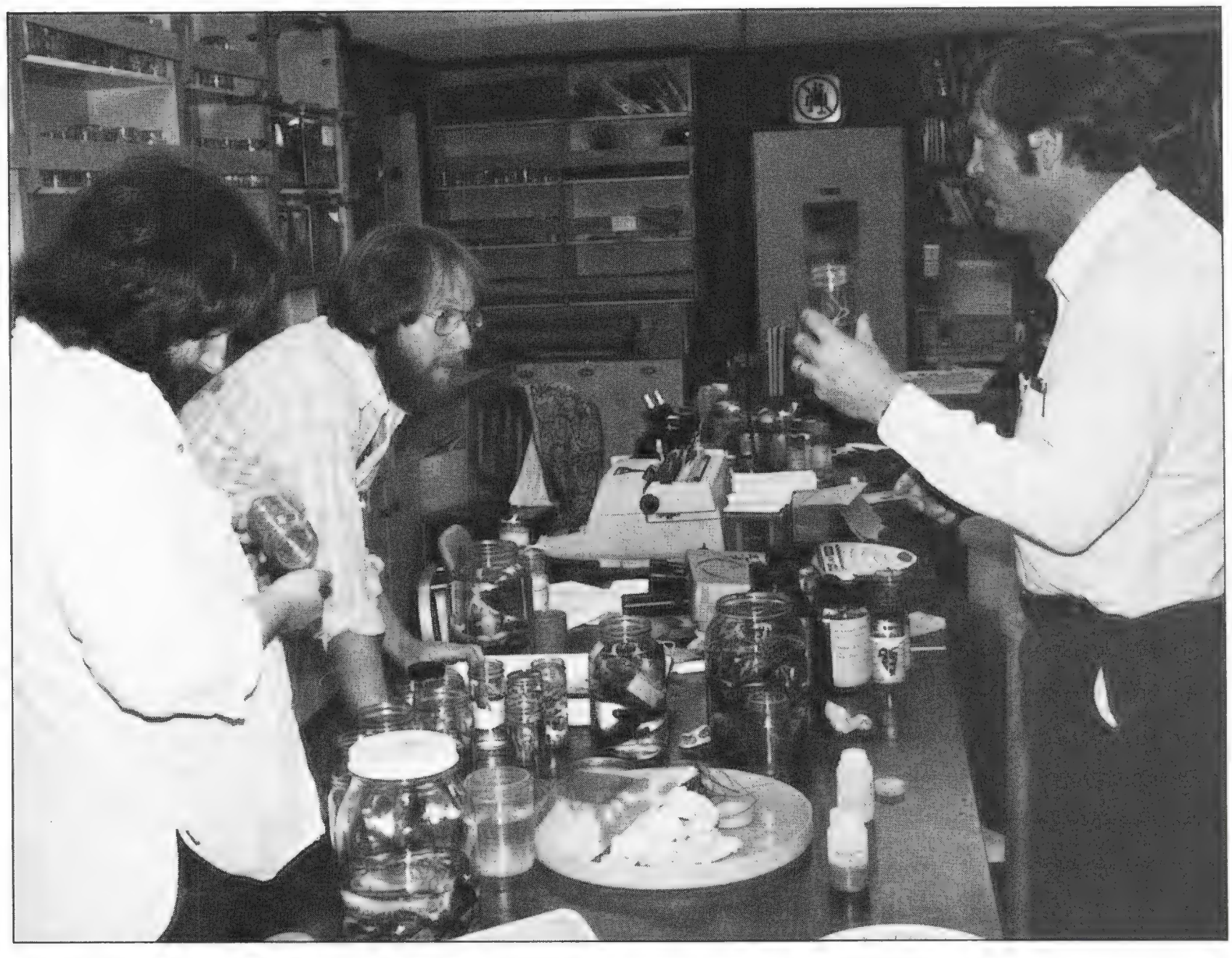
The National Science Foundation currently provides over $50,000 in yearly support to the Department of Herpetology, including a "visiting scientist" program, which allows scholars from other institutions to visit the department and assist in upgrading portions of the collections within their field of expertise. Under this program, Dr. Scott Moody of Ohio University upgraded our African lizards of the Agamidae, and Dr. J. Martin Walker from the University of Arkansas worked on lizards of the genus *Cnemidophorus*.

Dr. Jacques Gauthier, our first Herpetology Fellow, also joined the staff. Dr. Gauthier received his Ph. D. from the University of California, Berkeley. His research interests concern both fossil and extant lizard groups, and he is an expert on relationships within the Diapsida.

Jens Vindum, Collection Manager, received his master's degree from San Francisco State University. He plans to publish his dissertation on embryonic developmental rates and physiological tolerances in two local salamander species.

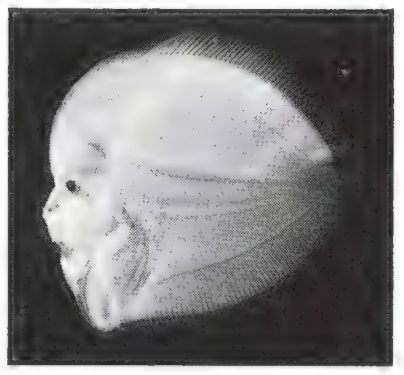
Dr. Drewes continued his research program on the biosystematics of African reptiles and amphibians, and his physiological research on waterproof frogs

Above, the elegant coiled skeleton of a snake, one of the herpetology department's 225,000 specimens. Right, department staff (left to right in photo) Larry Wishmeyer, Jens Vindum, and Dr. Robert Drewes discuss recently collected African frogs in the Herpetology laboratory.



with Drs. Stan Hillman, Phillip Withers of Portland State University and Gopi Menon of Veterans Administration Hospital. His monograph on African treefrogs has been published in the *Occasional Papers* of the Academy. Drewes and Vindum spent four weeks in the field in Kenya, after which Drewes led a members tour in Kenya and Rwanda. Drewes was coordinator and participant in the CAS/SFSU graduate course "Advances in Biosystematics." He also gave ten lectures and seminars at the Academy and at five other institutions on his research and other African topics. In May, he travelled to Harvard University for two weeks as a visiting scholar, where he lectured and prepared a status report on the African collections at the Museum of Comparative Zoology. He spent an additional week at Yale University and the U.S. National Museum. During the year, Dr. Drewes led two additional member's trips and participated in the physiological ecology meetings in June in Zzyzx, California.

In January, the Pacific Division of the American Association for the Advancement of Science began supporting half of Dr. Leviton's salary, while he remains curator half-time, thus allowing for funding of the yearly Herpetology Fellowship. He continued his research on Southwest Asian reptiles and the history of science. As executive director of the AAAS Pacific Division he is responsible for the organization of the annual meetings of the division. He has established a vigorous publication program for the AAAS and to date has co-edited four symposium volumes. Dr. Leviton also serves as Academy consultant on computerization. This year, he was senior author of the report of a National Science Foundation committee to assess computer applications in herpetology and ichthyology.



Above, this dime-sized larva of a bottom-dwelling flatfish is among the Ichthyology department's holdings. Below, at the annual Open House, Dr. William Eschmeyer explains to young visitors how sharks can grow replacements for lost teeth.

Dr. Walter C. Brown, our resident Research Associate, toured major eastern institutions to examine material for his revision of the skink genus *Emoia*. This trip was sponsored in part by the Department. Dr. Brown is a world authority on the fauna of the Philippine Islands and, together with Research Associate Angel Alcala of Silliman University, Dumaguete, has published numerous articles and books on the subject. He recently received a grant from the American Philosophical Society to support a tour of European museums this summer.

Dr. Mills Tandy, of Austin Community College, Austin, Texas, is an expert on African toads. He is a very active Research Associate, and the Department supports his utilization of the computer facilities at the University of Texas.

Margaret Berson, Secretary to both the department and the AAAS Pacific Division, together with Dr. Drewes, has embarked on a program of translation of African herpetological literature, from both French and Italian. Copies of these translations are transmitted to the Society for the Study of Amphibians and Reptiles.

Along with their extensive curatorial responsibilities, Jens Vindum, Collection Manager, and Larry Wishmeyer and Sue Powers, Curatorial Assistants, continue to serve the Academy through teaching in the Junior Academy, interacting with customs authorities and the Fish and Wildlife Service, and lectures to such outside organizations as the Marin SPCA, the Youth Conservation Corps, and the Bay Area Amphibian and Reptile Society. All participate in the department's popular annual event, Things That Go Bump In The Night, presented through the Academy Adult Education program.

Ichthyology

Tomio Iwamoto, *Chairman and Associate Curator*

The fish collection was expanded during the year by the addition of 9,406 specimens in 1,837 lots and now totals an estimated 1.5 million specimens in 187,000 lots.

Type-specimens of twenty species were received from twelve individuals. Other noteworthy additions included: Philippines and Kapuas River (Borneo) fishes from Tyson Roberts; Orinoco Delta (Venezuela) fishes from the Smithsonian Oceanographic Sorting Center; additional A.W. C. T. Herre Philippine fishes from the University of Washington; Rio Madre de Dios (Peru) fishes from Tomio Iwamoto; Sri Lanka fishes from Peter Moyle; scorpaenids and macrourids from N. V. Parin of The P. P. Shirshov Institute of

Oceanology, Moscow; Channel Islands (California) fishes from John McCosker; miscellaneous California fishes from Laurie Podshadley; and miscellaneous fishes from the Scripps Institution of Oceanography.

Loans of 3,652 specimens in 990 lots were sent to scientists around the world in 112 transactions. In addition approximately sixty-two visiting scientists used the collection.

The National Science Foundation provided $59,847 in support of our collections in the third year of a five-year grant. The grant supports two curatorial assistants and provides funds for supplies and equipment.

Support for our function as voucher-specimen repository for studies of the outer continental shelf in Alaska was continued in the amount of $33,294 for calendar year 1983. The grant is administered by the National Marine Fisheries Service, NOAA, for the Bureau of Land Management. Scott Cutler serves as Project Manager.

Dr. Iwamoto took over as chairman of the department on 1 July 1982 and resigned as editor of Scientific Publications on 1 January 1983. In addition to his administrative duties, he continues his research on grenadier fishes and serves as co-index editor for the journal *Copeia*. He spent one month in southeastern Peru collecting fishes in the Rio Madre de Dios.

Dr. William N. Eschmeyer rotated out as chairman of the department but continued his administrative duties as Director of Research for the Academy till 30 June 1983. His *Peterson Field Guide to the Pacific Coast Fishes* was published in March. He continued his long-term research on scorpionfishes and on a second field guide to the freshwater fishes of North America.

Dr. Tyson R. Roberts, Research Biologist, completed several papers on his research on freshwater fishes, and nears completion of a major monograph on the freshwater fishes of Borneo.

W. I. Follett, Curator Emeritus, continued his research on California fishes and on archaeological fish remains. He assisted other scientists on nomenclature problems, an area in which he is uniquely qualified because of his background as a practicing attorney.

Mrs. Lillian J. Dempster worked on nomenclature problems, served as indexer of the Academy's *Proceedings*, and co-index editor of *Copeia*.

Invertebrate Zoology & Geology

Peter U. Rodda, *Chairman and Geologist*

The Departments of Invertebrate Zoology and Geology were combined administratively and physically on 1 July 1982. The combined Departments maintain four distinct major collections: living invertebrates, fossils (mostly invertebrates), diatoms (fossil and living), and minerals.

During the year, 7,500 specimen lots of living invertebrates were received in 172 accessions; 10,000 specimen-lots of newly and previously accessioned material were cataloged into the collections. A major acquisition was the 5,000-lot D. P. Abbott tunicate collection, the finest of its kind in the world; curation of this important collection has begun.

Also, seventy-two catalog lots of fossils comprising several hundred specimens were accessioned. Noteworthy accessions include display-quality specimens of trilobites and crustacea donated by Lewis K. Land, trilobites and other fossils donated by Victor J. Bergeron, and Mio-Pliocene mullusca from Baja California donated by Tom Stump. Molluscan fossils from San Mateo, Shasta, and Tehama counties, California, were collected as part of departmental research.

Margaret M. Hanna continued to care for the diatom collection, which contains about 52,000 microscope slides and several thousand unmounted samples. Volunteer diatomists initiated a project to catalog the large A. L. Brigger diatom slide collection.

Jean DeMouthe continued to supervise the mineral collection, which contains 13,446 accessioned specimens, 313 specimens having been accessioned during the year. Notable accessions include a magnificent 5-carat demantoid garnet gemstone donated by Mr. and Mrs. W. A. Burgstrom, a 7-carat violet sapphire donated by Mr. and Mrs. Donald Heyneman, and other gemstones and minerals donated by Mr. and Mrs. Roger Barbey, Nathan Becker, Mr. and Mrs. Walter Dawson, Sami Haddad,

Left, mantis shrimps, primitive crustaceans, are preserved in jars in the Invertebrate Zoology department's large collections. The shrimps' powerful grasping appendages make them formidable predators. Above, a member of the sea star genus Oreaster, *a group found in shallow tropical seas worldwide and represented in the museum's comprehensive holdings.*

Jack Halpern, Julian Hoffman, A. L. McGuiness, S. A. Pullman, and Leo Rosenhahn.

Loans of 2,600 specimens of living invertebrates, fossils, diatoms, and minerals were made in 237 separate transactions. The departments received approximately 400 visitors during the year.

The National Science Foundation provided $52,600 for support of the collections, including the final allocation of a three-year grant for selected living invertebrates, the first year of a three-year grant for the mollusk collection, and a one-year grant for the Abbott tunicate collection. The grants provide salaries for curatorial assistants and funds for supplies and equipment.

In October the Academy sponsored a symposium, "Reducing Earthquake Risk to Collections," designed to educate collection-oriented professionals about earthquake hazards. Jean DeMouthe and Peter Rodda were members of the committee that planned and conducted the symposium, and both participated in the formal program. Department staff were involved with exhibit development, teaching Adult Education and Junior Academy courses, leading field trips, and providing identification and other services for the Academy, other institutions, and the public.

Dr. Terrence M. Gosliner was appointed Assistant Curator for Malacology. He will be supervising the curation of the large collection of wet-preserved and dry-shell mollusks. Dr. Gosliner, a specialist on opisthobranch snails, spent part of the year at the Smithsonian Institution on a post-doctoral fellowship studying southern African opisthobranchs.

Dr. Michael T. Ghiselin, a distinguished evolutionary biologist and a MacArthur Foundation Fellow, joined the staff late in the fiscal year. Dr. Ghiselin will be conducting research on major problems of evolutionary biology.

Dr. Elizabeth Nesbitt, first recipient of the Tilton Postdoctoral Fellowship, has been conducting a comparative study of Eastern Pacific living and fossil representatives of the marine snail *Nassarius*.

Dr. Daphne Dunn continued her extensive work on sea anemones, including study of sea anemone-clownfish symbiosis, an inventory of sea anemones of the Pacific coast of the U.S., systematics of Antarctic sea anemones, and study of shell-forming sea-anemones. She spent part of the year at Lizard Island Research Station in Australia.

Dr. Welton L. Lee expanded his research program on the systematics of sponges, including the assessment of biochemical and morphological variation in California sponges, the use of pigment patterns in sponge systematics, and a monograph of Haplosclerid sponges of the Eastern Pacific. Dr. Lee's work has involved field collecting in central and northern California and visits to other sponge specialists and collections.

Dr. Peter Rodda continued his research on Cretaceous and Neogene mollusks of northern California, including field studies and collecting in Shasta, Tehama, San Mateo, and San Francisco Counties, California.

Dr. Barry Roth continued his studies of land mollusks of Western North America, including field studies on the Channel Islands of southern California.

Ornithology & Mammalogy

Luis F. Baptista, *Chairman and Associate Curator*

A total of 214 bird and 155 mammals specimens were accessioned during the year. Among these were 39 marine mammals, including 19 harbor porpoises that washed up dead on the local beaches along with several harbor seals, all victims of shallow water gill-net fishing.

A polar bear and a gorilla were received from the San Francisco Zoo, a clouded leopard and Siberian tiger from the Folsom Zoo, and a pilot whale from Marine World—Africa USA. Although zoo specimens are not prime catches, we feel that some are important, either because of their rarity or because they represent taxa missing from the

collection. For example, Dr. Hap Paul of the Sacramento Animal Medical Group has borrowed hips and femora of our zoo-donated snow leopards to x-ray in preparation for a hip replacement operation on a snow leopard in the Guelph Zoo, Canada. The gorilla we received from the SF Zoo, an adult female, was the subject of a lengthy dissection performed by a team of physical anthropologists at UC Santa Cruz, led by Dr. Adrienne Zihlman, a recently elected fellow of the Academy.

Mr. Kenneth Walker added another seven specimens of African mammals from Lake Manyara to the already impressive collection he gave last year.

Most birds received were aviary specimens filling gaps in our holdings, as well as white-crowned sparrow collected by Dr. Baptista for his research.

In other areas, Dr. Luis F. Baptista continued his work on song dialects and mate selection in White-crowned Sparrows, song learning and sensitive phases, behavior and taxonomy of *Zenaida* doves, and field work in the Sierra Nevada and Point Reyes trapping and recording song of white-crowned sparrows. He has started revision of the Fourth Edition of "The Life of Birds" as coauthor with Dr. J. Carl Welty.

Dr. Robert T. Orr served as one of the associate editors of *Pacific Discovery*, Chairman of the travel committee, and mentor of the Docent Council. Considerable time was involved in organizing the Basic Training Course for new docents. He also led or participated in Academy trips to Australia and New Zealand; mushroom forays to Mendocino County and Mt. Tamalpais; and a special trip on the *Lindblad Explorer* to the far edge of Asia. He devoted considerable time to working with the San Francisco Bay Conservation and Development Commission on the protection of harbor seals in San Francisco Bay.

Dr. Lewis Petrinovich, Research Associate, was elected a fellow of the Academy. He continued the collaborative research with Dr. Baptista on song development in white-crowned sparrows and collected, for the eighth year, data on the population dynamics and song types in two color-banded study populations of white-crowned sparrow (supported by the National Institutes of Health and the National Science Foundation). Collaborative research was also done with Dr. Barbara DeWolfe and Dr. Baptista regarding the characteristics of white-crowned sparrow song in the non-breeding season. A research proposal to study a theoretical model of habituation and sensitization, using the three-spined stickleback, was submitted to the National Institute of Health and to the National Science Foundation in collaboration with Dr. H. V. S. Peeke of the University of California, San Francisco.

Mrs. Jacqueline Schonewald carried on her duties as manager of the collections, handling loans, correspondence, and other transactions, and visitors. She was assisted by volunteers and staff. Her work (on her own time) on stranding records on the central California coast is progressing. Her paper on cranial morphometry of the Pacific Coast Elk (with C. Schonewald-Cox and Jonathan Bayless) has been accepted for publication.

With the expert help of volunteer George Swortfiguer she was able to implement part of the earthquake proofing of the collections. She was also invited to participate in several hearings having to do with regulation of gill-net fishing along the Central California Coast. Records were kept of casualty strandings and passed on to Point Reyes Bird Observatory for processing. An active cooperation is maintained between our two institutions as Dr. Baptista is on the Observatory's board of directors and Mrs. Schonewald cooperates with that group in marine mammal salvaging activities and movements. A great deal of her time was taken up by filling "Questionnaires on Collections" for several museums and systematics associations.

Since 1 October 1982 Mrs. Schonewald has been on a four-day week, the fifth day being taken over by Mrs. Betsey Cutler, an ornithologist. Mrs. Cutler is handling the integration of four major collections of birds in the Passeriformes. She also handles insect-proofing the collection and many other tasks.

Dr. Barbara DeWolfe, in collaboration with Dr. Baptista, conducted field research on song and territorial establishment in the white-crowned sparrows of Golden Gate Park.

Dianna Stammerjohn and Mary Gillman-Marcussen devoted their time to the maintenance of the acoustical laboratory and the care of the research birds. They are also assisting Drs. Baptista and Petrinovich in their research projects, in addition to carrying out their secretarial and curatorial duties. Lise Thomsen Jones has continued her skillful handling of preparations, as well as consultation in husbandry.

A $1,000 grant from Mr. Kenneth Walker enabled completion of curating and cataloging of his African mammal collection. This was done by Roger Harm, a graduate student from San Francisco State University, who ordinarily volunteers in the department and has helped catalog and process other mammal collections.

Revision of the Stanford bird collection is being continued by Research Associate Dr. John Arnold. Mrs. Mildred Soules is working steadily at cataloging and sorting the element collections. Participation in documenting the natural features of Pepperwood Natural Reserve included Dr. R. T. Orr (fungi), Dr. John Arnold (mammals) and Dr. L. Baptista (birds).

Fifty-five loans were sent out totaling 182 birds, 107 mammals, 2 lots of eggs, plus tapes, and films. Among these, three were for anthropology projects, fourteen for systematic projects, three for government agencies, five for artists, twelve for classes, five for commercial outfits, four for CAS exhibits and six for the Junior Academy. Our department initiated four loans involving 26 birds; these were returned. Six hundred forty-five visitors logged a total of 708 days of work or visits.

Above, taxidermist Fred Funk prepares an ostrich for public display during the annual Open House. Right, also at Open House, Collections Manager Jacqueline Schonewald discusses the wide diversity of fur patterns in carnivores. The Ornithology and Mammalogy department holds more than 112,000 specimens of mammals and birds (far right).

Scientific Publications

Peter U. Rodda, *Chairman and Editor*
Sheridan Warrick, *Production Editor*

During the year, the Academy's Scientific Publications program underwent a major reorganization. Tomio Iwamoto resigned his editorship to expand his research efforts, and the editorial responsibilities were divided between Peter Rodda of the Departments of Invertebrate Zoology and Geology and Sheridan Warrick, Editor of *Pacific Discovery*. Since the last annual report, five issues of the *Proceedings* and one volume of the *Occasional Papers* have been published, totalling 115 pages. At the end of the fiscal year more than six papers in the *Proceedings* series and two *Occasional Papers* had been accepted for publication and were undergoing processing.

Academy publications are mailed to 829 individuals and institutions, including 135 on exchange with domestic institutions, 490 with foreign institutions, and 204 subscriptions (foreign and domestic).

Members of the Scientific Publications committee were Frank Almeda, Daphne F. Dunn, William N. Eschmeyer, Tomio Iwamoto, Peter U. Rodda, Frank H. Talbot, and Sheridan Warrick. Lillian J. Dempster served as *Proceedings* Indexer.

Library

Ray Brian, *Librarian*

This has been a year of intensive planning. The J. W. Mailliard, Jr. Library launched its own long-range plan more than a decade ago when it began the reclassification of total library holdings from Dewey to Library of Congress systems. The library underwent major internal and external evaluation. From this came support for the reclassification project and renewed emphasis on automating. The prime new objective was for the library to obtain its first computer terminal and gain access to large bibliographic and other data bases. By the end of the year we had our terminal and printer and needed only minor wiring to move into the computer world.

Meanwhile, the library continued to provide its basic support to research at the Academy. We were able to subscribe to new research journals, particularly supporting newer Academy research

emphases: anthropology and conchology. Additional support for research came from the journals which we began receiving as a result of new exchanges which were established. We now have 650 exchange agreements under which we supply our research journals and in return receive other institutions' research journals.

On 1 August 1982 Richard Pallowick, a recent UC Berkeley Library and Information Studies graduate, joined our staff, with responsibility for cataloging, classification, and the reclassification project. He replaced Linda Naru, who left for a job in the Midwest.

Marion Birkmeyer resigned 29 April 1982 to take a job in the Genentech technical library. This post remained vacant until it was filled by Lesley Segedy on 12 July 1982. Lesley had recently completed the Library Technology Program at San Francisco City College and had worked as a volunteer in the Discovery Room.

Increased budget support enabled us to make significant additions to library holdings. Notable new titles include Bender's *Reference Handbook on the Deserts of North America*, *Tropical Rain Forest Ecosystems: Structure and Function*, the complete ten volumes of the *New York Botanical Garden Illustrated Encyclopedia of Horticulture*, Davis's *Flora of Turkey and the East Aegean Islands*, volume 4 of Van Royen's *Alpine Flora of New Guinea*, the important *Fishes in North American Deserts*, and Wiedenmeyer's *Shallow Water Sponges of the Western Bahamas*. With Steinhart Aquarium's city funds we purchased a number of works including the two volume *Diseases of the Reptilia* and *Cetacean Behavior.*

Academy support enabled both assistant librarians to affiliate with the American Library Association and the Special Libraries Association and to attend the annual conference of the American Library Association in Los Angeles. Support from this fund enabled the Librarian to visit the libraries of the Air and Space Museum and the National Museum of Natural History of the Smithsonian Institution in Washington, D.C. and the library of the American Museum of Natural History in New York.

Lloyd Ullberg

ADMINISTRATION

Business Office

Mrs. Nancy B. Dykes, *Director of Administration*

Mrs. Dykes works closely with the treasurer, Trustee Eugene A. Shurtleff. Her responsibilities include budget preparation and control; supervision of the accounting, admissions, personnel, and operations staff; oversight of the Academy's Commercial Building (with Trustee Peter B. Bedford and Property Manager Robert E. Berger); preparation and presentation of the city budget request for Aquarium funds (with Aquarium Director John McCosker); and control of foundation, endowment, special purpose, and grant funds.

She is ably assisted by Controller Jan Yau, who manages the Accounting and Business Office functions; Robert Berger, who manages the Commercial Building; Frank DeOme, who manages building operations; Joni Hall, who manages the personnel functions; and Tina Ahn, who oversees the Admissions Department.

Special note should be made of the accounting staff and the great strides they have made in managing and reporting the Academy's financial resources. A computer service bureau system now provides timely management reports to the Board of Trustees, senior staff, and department chairmen. Chief Accountant Dawn Davis deserves mention for the many hard hours she has spent customizing accounting software to fit the institution's needs. Controller Jane Yau has done a superb job retraining her staff to function comfortably in the computer age.

A major artwork within the museum complex is Robert Howard's whale sculpture and fountain, originally created for the Golden Gate International Exposition of 1939.

Bob Berger and his two staff members manage the Academy's single most valuable asset, the Commercial Building, in excellent fashion. The building has more than 100 demanding tenants who keep Bob busy. He has kept the building 98 percent rented, one of the lowest vacancy rates in downtown San Francisco.

The Admissions Department is responsible for the single largest revenue source for the Academy. This year there was a 24 percent increase in admissions income due to an increase in admissions fees adopted in July 1982. Our cashiers and ticket takers welcomed 1,320,344 visitors.

The responsibilities of cashiers and ticket takers were excellently fulfilled by a staff of twenty-six. Not only does the staff accurately handle large sums of money but they enthusiastically assist the public by informing them on current exhibits and Planetarium show times. Recently our cashiers donned tuxedos to help participate in the festivities of opening day for our new Penguin Environment.

The complicated tasks of personnel record-keeping and payroll processing were effectively performed by Joan Hall. The staff now numbers 130 full-time and 106 part-time employees. A new salary system, which rewards employees for longevity and performance, was developed with the help of consultants from the Wyatt Company, and was fully functioning at the end of the fiscal year.

The staff of the business office including those individuals mentioned above and their support personnel, help make the Academy run smoothly, and their hard work and diligence is enthusiastically appreciated.

Public Information

Pam Wing, *Public Information Officer*

Exciting special events and exhibits are the keys to a successful public information office and this year was exceptional. "The Heritage of Islam," photos by Tupper Ansel Blake, Imogen Cunningham's one hundredth birthday exhibition, and the opening of the Aquarium's new Penguin Environment, meant new and newsworthy activity throughout the year for newspapers, major magazines, radio and television to feature.

To increase public awareness and provide science education, the Academy began its own radio show, "Science In Action," heard daily on KCBS Newsradio 74 and KQED-FM. This successful program is produced by Jerry Kay through the Public Information Office.

The Academy reached out this year to become a

Lloyd Ullberg

Above left, Dr. and Mrs. Frank Talbot celebrate with Mr. Eddie Elzas of Antwerp, Belgium, at the opening of the exhibit of Mr. Elzas's Rainbow Gems Collection, the world's largest and finest collection of natural colored diamonds.

founding organization of the first San Francisco Summer Festival. In May we sponsored the Pet Parade as part of Museum Sunday, a day set aside to focus on the educational value of thirty-two museums and cultural organizations in northern California. With the expertise of the Vorpal Gallery in San Francisco, the Academy was benefitted with a month-long display of whale art in February.

Throughout the year the Public Information Office coordinated openings and special dinners, produced the monthly Newsletter for members, handled inquiries from media and the general public on many subjects, and began a survey on visitor response to the Academy.

Pacific Discovery

Sheridan Warrick, *Editor*

This year the Academy's science and natural history magazine published more than twenty-two articles on evolution and adaptation, animal behavior, wildlife photography and art, history of science, astronomy, and endangered environments. In October of 1982, Bruce Finson, the magazine's editor for twenty-two years, left the Academy to pursue a new career as a consultant, teacher, and freelance writer. With the change in editors, the magazine was redesigned and reorganized to incorporate color photographs and to apply new approaches to articles. Along with these changes came a shift from bimonthly to quarterly publication. Nationally known authors and photographers published in the magazine included Paul R. Ehrlich, Victor B. Scheffer, David Cavagnaro and Edward S. Ross.

Associate editors are Robert I. Bowman, John E. McCosker, Robert C. Miller, and Robert T. Orr. Frank H. Talbot is Publisher. Johan Kooy is Art Director and Bill Prochnow, Design Consultant.

Picture Collection

Johan Kooy, *Chairman*

The Academy's Picture Collection is a rich mine of illustrative material, old and new, relating to the Academy now, its history, and the constantly changing face of the world about us, its plants and animals, the look of the earth, and the people who inhabit it. The collection is drawn upon by *Pacific Discovery*, Morrison Planetarium, the Exhibits Department, Junior Academy, and other educational functions of this institution and many others.

The most important additions to the collection during the past year were more than 11,000 professional-quality slides of nature and anthropological subjects from several major donors.

A significant reduction in the bulk of the collection is being accomplished by the well-considered removal of less desirable material from the files. Thirteen dedicated volunteers accessioned, lent, and refiled many thousands of images during the year.

Above, the new Sierra trout stream display, sponsored by the Bothin Helping Fund and Pacific Telephone, exhibits live trout, birds, and plants of California's Truckee River area.

Operations

Steven B. Craig, *Operations Manager*

The Instrument Shop, Cabinet Shop, Security and Custodial departments must coordinate their efforts to insure that the Academy maintains a high level of efficiency. A good example among many was the installation of the Imogen Cunningham exhibit. The Cabinet Shop created new walls and partitions, the Instrument Shop installed the video system and special lighting, the Custodians cleaned up the work-related mess and prepared the area for public viewing, and the Security Department provided extra security for the valuable photographs. These kinds of group efforts were repeated many times during the year, making it possible to complete such projects.

INSTRUMENT SHOP. Frank DeOme, *Supervisor*. The Instrument Shop is involved in many projects throughout the Academy and is the hub of Operations activities. We build and repair instruments such as electronic programmers and microscopes; however, many other functions are also performed in the Instrument Shop.

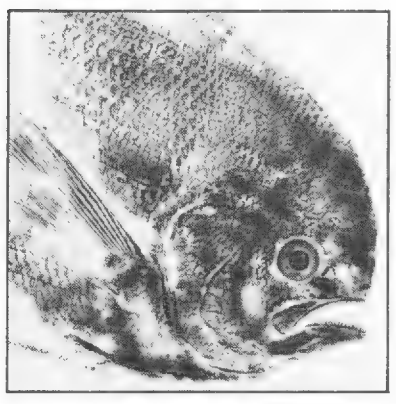
Electrical and lighting services are performed by Gill Fuller. Gill provided special lighting for many of the special temporary exhibits and upgraded some of the permanent exhibits lighting. He also installed new electrical service in many areas in our constant effort to upgrade the Academy's facilities.

Many audio-visual programs were added or changed during the year and a special new automatic programming system was installed to insure all electronic exhibits would go on and off at designated times. Cary Ponchione, Chief Technician, is in charge of all audio-visual systems and during the year many innovations were implemented.

In addition to the audio-visual equipment, our Electronics Technician, Larry Klingenberg, has recently completed an electronic tutoring system for the Birds and Mammals Department. This project included both design and fabrication.

Allan Wilson, Instrument Technician, was involved in many locksmith projects and microscope repairs. Allan constructed an elaborate exhibit called "Stop the Drop," used for the "Eye of Science" exhibit and well received by the public. It is being redesigned to be installed in the Aquarium.

Lonner Holden is our Maintenance Technician. Lonner pays special attention to safety problems but also attends to problems in many other areas.



The Print Shop is staffed by Bob Dueball and Stella Tatro. Bob is in charge of the printing and Stella does the bindery work. This year we upgraded and put into service a printing press which had been idle for fifteen years but was in better condition than the one we had been using. This "new" press is able to make many more impressions per hour, enabling us to print approximately 1.3 million impressions this year and with much better accuracy.

A Foucault Pendulum was installed in Austin, Texas, and three new pendulums are machined and ready for future sale. Foucault Pendulums are the only product that the Instrument Shop sells to other institutions. However, pendulums are typical of the shop's projects. Other projects this year were the vacuum fumigator, the museum public address system, the tidepool sound system, the Anthropology storeroom alarm system, and the new membrane installation for the roof of McBean-Peterson Gallery.

Through the years many persons have generously given the shop tools and equipment. This year we received a large collection of machine tools from Al Giddings and tool donations from Allan Hubbard and Jerry Cullen. In addition, the Instrument Shop received an electric fork lift from Bradley Buchanan. This forklift is useful to the entire Academy and appreciated by everyone.

CABINET SHOP. Eric Johnsen, *Supervisor*. The Cabinet Shop is involved in design and construction of fixtures and structures for all areas and departments of the Academy. Although exhibit construction represents a good portion of the work schedule, most, if not all, of the scientific departments get some shop time.

This year, as always, a wide variety of projects were handled throughout the Academy. The Departments of Invertebrates and Geology required some major remodeling. In addition to the above there were many other smaller jobs completed: a paint storage room in the garage area, two botany carts, ticket machine counters for the Planetarium and Admissions, bookcases for Entomology, special cabinets for Education and Travel, assistance to the Instrument Shop and the Exhibits Department, shoring up the floor of Mineral Hall, and making packing crates for the Library, Anthropology and a Foucault Pendulum assembly.

Both Jeffrey Mullin and Steven Katzman under Eric's supervision performed their duties admirably.

CUSTODIAL. Nathan Cole, *Maintenance Supervisor*. It is the responsibility of the custodial staff to keep the public and non-public areas of the Academy clean and to assist in moving furniture, equipment, and materials throughout the building. Mr. Cole, along with his three assistants, Rosa Ortiz, Daniel Langlands, and Jim Treats, takes care of these public areas during every hour the museum is open. In addition, a building maintenance company performs a major cleaning function every evening both in the public and research areas. Special major cleaning functions are performed in the evenings, and Mr. Cole supervises this operation and coordinates it with our busy evening schedule.

The Academy is expanding its evening use, often requiring extra service late into the night. Academy staff custodians are present during these functions to ensure a clean museum for the entire event. This type of extra service seems to be needed as often as two evenings per week.

SECURITY. Levelle Alderson, *Head Guard*. All aspects of security at the Academy are covered by our security guards. Every day of the year, 24 hours a day, guards are on duty. During the day, when the public is present, the guards act as information sources, registering a school group or paging for a lost child. They must also observe the behavior of everyone to ensure that visitors have a pleasant experience.

This last year a major change was made in security procedure. All the doors to the non-public areas have been kept closed and locked, and only a proper key will admit staff to these areas. Visitors to these areas must secure permission and a special day pass. All staff and volunteers have been issued identification badges that they must wear at all times when in the non-public areas.

Levelle is responsible for the scheduling of our nine

Left, at the annual Friends and Benefactors' dinner, Director Emeritus Dr. George Lindsay visits with volunteer and docent Janet Nickelsburg, who made possible the creation of the Discovery Room for children. Dr. Lindsay is Director of Pepperwood Ranch Natural Preserve (above).

full-time and eight part-time guards. He must also make sure they are properly attired and that their training is updated as new equipment is added and new procedures are adopted.

Pepperwood Ranch Natural Preserve

George E. Lindsay, *Director Emeritus of the California Academy of Sciences and Director of Pepperwood Ranch Natural Preserve*

Pepperwood is a 3,100-acre property located in Sonoma County sixty miles north of San Francisco. Formerly owned by Academy benefactors Mr. and Mrs. Kenneth K. Bechtel, it was given to the Academy by their Belvedere Scientific Fund after Mr. Bechtel's death. The Fund continues to provide substantial support for the Preserve.

Protection of a large unit of unspoiled natural land with diverse habitats is the principal purpose of Pepperwood Ranch Natural Preserve. Secondary but also important is compatible utilization of the Preserve for research and education projects and programs. A master plan for the development of the preserve is in preparation.

Educational use of Pepperwood Ranch Natural Preserve included Adult Education study tours for 245 members on geology and botany field trips and a scientific methods course.

The Junior Academy conducted eight field trips to Pepperwood, and two four-day camp sessions.

The Academy's taxidermy studio is located at Pepperwood Ranch Natural Preserve, and taxidermist Fred Funk serves as resident supervisor.

Development & Membership

Development

Charles B. Raaberg, *Director of Development*

This was a year of change in the Development Office. New this year were Charles B. Raaberg, Director of Development; Patricia A. Nicholson, Associate Director of Development; and Maribeth Riggs, Administrative Assistant. Frances Reed moved from office administration into development donor research. These organizational changes underscore the need to strengthen the Academy's base of support.

Continuity of leadership in the development and membership areas was provided by two trustee committees: Development Committee, chaired by Jeffery W. Meyer, and Membership Subcommittee, William J. Hume, Chairman. The perspective and commitment of these active committees provided an essentially new staff with the ideas and tools to develop a new program and to move it ahead.

The Friends of the Academy, our premier annual support group, was reorganized this year. Those who gave $5,000 or more were placed in a new donor category called the Trustees' Circle, and the Friends continued as before for those who gave $1,000 to $5,000. Three new Benefactors, whose individual cumulative gifts totalled $50,000 or more, were honored this year. A list of major donors appears by category on pages 34 through 36.

While gifts from individuals increased substantially, corporate gifts dropped somewhat. This decrease reflected the sluggishness of the economy; one-time larger gifts last year to match the Academy's NEA Challenge Grant; and the increased pressure from non-profit institutions on corporate gift funds because of federal funding cutbacks. Private foundation support remained at about the same level as last year. We would like to acknowledge the following corporations and foundations for their very generous contributions this year: BankAmerica Foundation; Basic American Foods; Bechtel Power Corporation; Belvedere Scientific Fund; Bothin Helping Fund; Lakeside Foundation; Llagas Foundation; the G. H. C. Meyer Family Foundation; Wilson & Geo. Meyer & Co.; Phoenix Science Center; The San Francisco Foundation; The L. J. Skaggs and Mary C. Skaggs Foundation; Standard Oil Company; Marshall Steel, Sr. Foundation; T. B. Walker Foundation; and Brayton Wilbur Foundation.

Membership

Alice Franco, *Membership Coordinator*

This year new efforts were initiated to increase the number of members. Results of this endeavor were impressive: the number of members grew to a total of 17,288, representing a 40 percent increase over last year; and income from memberships was $436,022, an increase of 44 percent. In addition, two appeals for added gifts were sent to existing members with equally satisfying results: over $75,000 was raised to help the Academy finance plans for the future and to support important scientific work. Theresa A. Schulze and Janet Farmer handled many of the important details of the department's functions.

The challenge of the future is to improve in the years ahead the already impressive quality of the public exhibitions, education, and scientific programs of the Academy. New facilities will be needed, old exhibit areas modernized, and scientific support funds will need to increase. The ability of the Academy to achieve these goals will depend upon the growing support of the community. The community has been generous to the Academy in the past, and all indications suggest that this support will both continue and expand in the years ahead.

Staff

(as of 30 June 1983)

Frank H. Talbot,
Executive Director

Eugene F. Behlen, *Director of Public Programs*
Nancy B. Dykes, *Director of Administration*
William N. Eschmeyer, *Director of Research*
John E. McCosker, *Director of Steinhart Aquarium*
Charles B. Raaberg, *Director of Development*

George E. Lindsay, *Director Emeritus; Director of Pepperwood Natural Preserve*
Robert C. Miller, *Director Emeritus*
Robert C. Orr, *Senior Scientist*
Ruth Connelly, *Secretary to the Executive Director*

AQUARIUM, AQUATIC BIOLOGY

John E. McCosker, *Director, and Curator, Aquatic Biology*
Tom Tucker, *Assistant Superintendent*
Robert P. Dempster, *Curator Emeritus*
William F. Rohrs, *Senior Aquatic Biologist*
F. Edward Ely, *Herpetologist*
Francis X. Glennon, *Aquatic Biologist*
Lloyd F. Gomez, *Aquatic Biologist*
Yaye Herman, *Microbiologist*
John C. Hewitt, *Aquatic Biologist*
Bruce I. Hiler, *Aquatic Biologist*
Edward E. Miller, *Aquatic Biologist*
Jonathan K. L. Mee, *Aquatic Biologist*
Patricia Morales, *Pathologist*
Christina J. Slager, *Office Coordinator*
James Derzon, *Exhibit Preparator*
Roberto Ayala, *Painter*
Amy Pertschuk, *Graphic Artist*
Stewart Madin, *Veterinary Associate*
Melvin Donaldson, *Research Associate*
James Kerr, *Research Associate*
Samuel Taylor, *Research Associate*
Charles Wright, *Field Associate*
Lynn G. Dunne, *Associate*
Lester C. Gunther, Jr., *Associate*
Edwin Janss, Jr., *Associate*
Jeffery W. Meyer, *Associate*
William J. Bennetta, *Research Associate*
Al Giddings, *Research Associate*
Michael D. Lagios, *Research Associate*
Wayne Lanier, *Research Associate*
Leighton R. Taylor, Jr., *Research Associate*
Peter Ward, *Research Associate*

PUBLIC PROGRAMS

Eugene F. Behlen, *Director*
Caroline R. Pagone, *Administrative Secretary*

PLANETARIUM

Lee W. Simon, *Acting Director and Astronomer*
Bing F. Quock, *Acting Assistant Supervisor*
Elizabeth Keough, *Secretary*
Jeffrey Carl, *Technician*
Darryl Skrabak, *Assistant Technician*
Linda Grandke-Kulik, *Artist/Photographer*
Clay P. Butler, *Research Associate*
Charles F. Hagar, *Planetarium Associate*
Ron Hipschman, *Planetarium Associate*
Leon Salanave, *Planetarium Associate*
Jose Mena, *Lecturer*
Benjamin Mendelsohn, *Lecturer*
Marguerite Ross, *Lecturer*
Richard Sanjour, *Lecturer*
Norman Sperling, *Lecturer*
Walter F. Terris, *Lecturer*
Don Warren, *Lecturer*
Robert Lai, *Console Operator and Floor Manager*
Michael Tong, *Console Operator and Floor Manager*
William Ward, *Floor Manager*
Tania Zilli, *Floor Manager*
Guillaume Gassuan, *Console Operator/Usher/cashier*
Robert Carini, *Usher*
Dana Chivers, *Cashier*
Joycelin Craig, *Usher*
Erika Davis, *Usher/cashier*
Lisa Gold, *Usher*
Anna Reisman, *Usher/cashier*
Tanya Sinclair, *Usher/cashier*
James Sweeney, *Usher/cashier*
Anita Whites, *Usher*
Patrick Yuschenkoff, *Usher*

EXHIBITS

Kevin O'Farrell, *Acting Chairman and Design Director*
Fred Funk, *Taxidermist*
Joyce Anne Gilio, *Registrar*
Madeleine Graham, *Designer*
Hitoshi Sasaki, *Designer*
Mary Ford, *Graphic Designer*
Phillip Fraley, *Exhibits Preparator*
Bruce Goldsmith, *Exhibits Preparator*
Theresa Norris, *Secretary*

EDUCATION

Susan Douglas, *Acting Chairman*
Diane Butler, *Volunteer Services Coordinator*
Sandra Lelich, *Travel Coordinator*
Brian Gibeson, *Junior Academy Staff Instructor*
Carol Prince, *Adult Education Coordinator*
Phoebe Grigg, *Junior Academy Secretary*
Molley Lowry, *Volunteer Services Secretary*
Andrea Wright, *Assistant Volunteer Coordinator*
Maeryta Packhurst, *Exhibit Preparator*

PHOTOGRAPHY

Susan Middleton, *Photographer*
Lloyd E. Ullberg, *Photographer*
Judith Steiner, *Photographic Assistant*

ANTHROPOLOGY

Robert H. Sayers, *Acting Chairman and Visiting Assistant Curator*
(Dorothy K. Washburn, *Chairman and Associate Curator* on leave 1982-83)
Diane Lee Carroll, *Research Archaeologist*
Joan Bacharach *Collection Manager*
Terri Berman, *Curatorial Assistant and Secretary*
John Adair, *Research Associate*
Donald Haggerty, *Research Associate*
Sandra McCosker, *Research Associate*
Michael Moratto, *Research Associate*

BOTANY

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Fellows' Medalist

Each year, one or more prominent scientists is selected for special honors. At the fellows' meeting in October of 1982, the institution's highest award, the Fellows' Medal, was presented to UC Davis Professor Emeritus G. Ledyard Stebbins. The award was given in reognition of Dr. Stebbins's superior scholastic achievements in genetics and plant evolution, and for his active participation in advancing the work of the Academy.

Dr. Stebbins founded the genetics department at the University of California, Davis, and served as its head from 1959 to 1962. In 1979 he was awarded the National Medal of Science from the National Science Foundation. The Academy is pleased to recognize Dr. Stebbins.

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California Academy of Sciences Financial Statement

STATEMENTS OF CURRENT FUNDS—GENERAL OPERATING REVENUES, EXPENSES, TRANSFERS AND FUND BALANCE *Years ended 30 June 1983 and 1982*

	1983	1982
Revenues:		
Support from the public:		
Corporate contributions	$ 50,580	80,629
Individuals, trusts and private foundations	198,588	137,156
Membership dues and tuition	444,680	307,268
Total support from the public	693,848	525,053
Operating income:		
City and County of San Francisco support of operations (note 8)	963,187	886,428
Fees and grants from others	151,417	112,095
Planetarium (including Light Show income of $80,559 in 1983 and $139,012 in 1982)	249,723	332,554
Admissions	1,457,893	1,178,399
Sales desk royalty	95,665	104,499
Restaurant royalty	110,630	110,519
Other	87,574	77,929
Total operating income	3,116,089	2,802,423
Investment income:		
Net rent from commercial building	523,216	445,299
Interest and dividends	309,033	298,990
Total investment income	832,249	744,289
Total revenues	4,642,186	4,071,765
Transfers from other funds:		
Special purpose fund income	703,834	290,000
Travel program income	50,000	80,000
Total revenues and transfers	5,396,020	4,441,765
Expenses:		
Aquarium and museum	1,558,699	1,496,020
Departmental research and curatorial activity	1,094,711	915,980
Planetarium	196,629	157,186
Light Show	46,245	38,554
General and administrative	2,517,136	1,827,956
Employees' pension annuity (note 6)	88,795	83,399
Total expenses	5,502,215	4,519,095
Deficit of revenues and transfers over expenses	(106,195)	(77,330)
Fund balance (deficit) at beginning of year	(77,018)	312
Fund balance (deficit) at end of year	$ (183,213)	(77,018)

See accompanying notes to financial statements.

STATEMENT OF CHANGES IN FUND BALANCES *Year ended 30 June 1983*

	Current funds				
	General operating	*Restricted to research*	*Special purpose funds*	*Endowment fund*	*Total all funds*
Balances at beginning of year	$ (77,018)	431,201	11,977,762	3,693,296	16,025,241
Additions:					
Operating income	3,116,089	—	—	—	3,116,089
Contributions, grants, dues, tuition and appropriations for endowments and special purposes	693,848	524,931	370,331	102,408	1,691,518
Investment income	832,249	380	834,698	—	1,667,327
Gain on sale of securities	—	—	1,934,645	85,540	2,020,185
Other	—	69,787	419,892	—	489,679
Total additions	4,642,186	595,098	3,559,566	187,948	8,984,798
Deductions:					
Operating expenses	5,361,181	323,201	—	—	5,684,382
Expenditures of research grants	—	116,417	—	—	116,417
Amounts expended for furniture, fixtures and equipment (note 9)	53,173	18,387	95,370	—	166,930
Amounts expended for construction (note 9)	—	—	102,546	—	102,546
Amounts expended for professional services	87,861	12,368	210,078	—	310,307
Other	—	—	609,475	—	609,475
Total deductions	5,502,215	470,373	1,017,469	—	6,990,057
Recovery of net unrealized loss on marketable securities (note 3)	—	—	192,722	285,432	478,154
Transfers between funds	753,834	—	(753,834)	—	—
Balances at end of year	$ (183,213)	555,926	13,958,747	4,166,676	18,498,136

See accompanying notes to financial statements.

ACCOUNTANTS' REPORT

The Board of Trustees
California Academy of Sciences:

We have examined the balance sheets of the funds of the California Academy of Sciences as of June 30, 1983 and the related statements of current funds—general operating revenues, expenses, transfers and fund balance for the years ended June 30, 1983 and 1982 and statements of changes in fund balances for the year ended June 30, 1983. Our examinations were made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances.

Under generally accepted accounting principles, expenditures for furniture, fixtures and equipment should be capitalized. The California Academy of Sciences charges such purchases to current expenses, the effect of which is more fully described in note 9.

In our opinion, except for the effect on the financial statements of the failure to capitalize expenditures for furniture, fixtures and equipment as discussed in the preceding paragraph, the aforementioned financial statements present fairly the financial position of the California Academy of Sciences at June 30, 1983, the results of its current funds operations for the years ended June 30, 1983 and 1982, and the changes in its fund balances for the year ended June 30, 1983, in conformity with generally accepted accounting principles applied on a consistent basis.

Peat, Marwick, Mitchell & Co.
San Francisco, California
2 September 1983

California Academy of Sciences BALANCE SHEETS *30 June 1983*

	Current funds				
	General operating	*Restricted to research*	*Special purpose funds*	*Endowment fund*	*Total all funds*
ASSETS					
Cash:					
Commercial Accounts	$ 3,221	76,162	7,351	4,652	91,386
Savings accounts	—	—	315,415	101	315,516
	3,221	76,162	322,766	4,753	406,902
Receivables:					
Proceeds on sales of marketable securities	—	—	1,918,224	—	1,918,224
Research grants (note 2)	—	437,451	—	—	437,451
Accrued interest and dividends receivable	45,568	—	101,889	—	147,457
Other	22,246	1,244	124,927	8,793	157,210
	67,814	438,695	2,145,040	8,793	2,660,342
Prepaid expenses	52,893	—	—	—	52,893
Investments (note 3):					
Marketable securities	—	—	9,746,161	3,702,089	13,448,250
Real property (note 10)	—	—	1,545,960	608,084	2,154,044
Due from other funds	—	49,249	229,331	—	278,580
Total assets	$123,928	564,106	13,989,258	4,323,719	19,001,011
LIABILITIES AND FUND BALANCES					
Liabilities:					
Accounts payable	113,442	8,180	21,816	—	143,438
Accrued expenses	6,578	—	—	—	6,578
Other liabilities	65,584	—	8,695	—	74,279
Due to other funds	121,537	—	—	157,043	278,580
	307,141	8,180	30,511	157,043	502,875
Fund balances (deficit):					
Current unrestricted, available for general operations	(183,213)	—	—	—	(183,213)
Current restricted, designated by donors for:					
Research grants	—	555,926	—	—	555,926
Special purpose	—	—	13,958,747	—	13,958,747
Endowment fund, under board discretion	—	—	—	4,166,676	4,166,676
Fund balances (deficit)	(183,213)	555,926	13,958,747	4,166,676	18,498,136
Total liabilities and fund balances	$123,928	564,106	13,989,258	4,323,719	19,001,011

See accompanying notes to financial statements.

California Academy of Sciences
NOTES TO FINANCIAL STATEMENTS
30 June 1983

1. Summary of Significant Accounting Policies

The California Academy of Sciences (the Academy) uses the accrual method of accounting with revenue recorded when earned and expenses recorded when incurred. Government grants are recognized in full when awarded.

Gifts of specimens and collections are not included in the financial statements.

Donated materials and services are not recorded.

The Academy has the following funds:

A. Current General Operating Fund—This fund accounts for resources used in carrying on the routine operations of the Academy in accordance with the limitations of its charter and bylaws. The Board of Trustees exercises discretionary control over this fund.

B. Restricted Funds:

1. The current restricted to research fund accounts for gifts and grants restricted to research projects. Certain of the current general operating fund expenditures are also for research.

2. The special purpose funds account for resources contributed to the Academy for specific purposes other than research projects. The resources are currently available for use, but expendable only for the purposes specified by the donors. Included are two major restricted funds, the William H. Noble fund and the Sinon Clare Lillis fund. Other accounts in this fund are designated for plant additions, curatorial chairs, departmental endowment funds, special exhibitions and other special purposes. Income earned on these funds is generally available for the use of various Academy departments as designated by the Board of Trustees for operations. Expenditure of principal is also allowable if not specifically restricted by the donors, and it may be spent with Board action.

C. The endowment fund is comprised of unrestricted gifts and bequests. Unrestricted gifts in excess of $10,000 and life memberships in the amount of $500 are credited to this fund. The principal amount of the gifts and bequests is not maintained intact in perpetuity. Transfers from the endowment fund and dispositions of its principal are made at the discretion of the Board of Trustees.

The endowment investment income is credited, as earned, to the current general operating fund.

2. Research Grants Receivable

Grants receivable represent amounts pledged to the Academy for certain operations and for the completion of designated projects in future years. The grants are collected when expenditures are made for the designated project. A summary of grants receivable follows:

National Endowment for the Arts	$ 47,977
National Science Foundation	382,438
Other	7,036
	$437,451

3. Investments—Marketable Securities

Securities are recorded at the lower of aggregate cost or market in accordance with generally accepted accounting principles. If acquired by gift, a security's cost is equal to the fair market value at the date of acquisition. To reduce the carrying amount of the marketable securities portfolios to market, which was lower than cost at 30 June 1982, a valuation allowance was established by charges to fund balance representing the net unrealized losses. At 30 June 1983, the aggregate market value of the marketable securities portfolio was higher than aggregate cost. The valuation allowance of $478,154 established in the prior year was eliminated due to the recovery of the net unrealized losses. At 30 June 1983, the book value and net unrealized gains pertaining to the marketable securities portfolios were as follows:

	Book value	*Market value*	*Net unrealized gain*
Special purpose funds:			
Bonds and cash equivalents	$5,557,293	5,640,311	83,018
Stocks	4,188,868	5,740,606	1,551,738
	$9,746,161	11,380,917	1,634,756
Endowment fund:			
Bonds and cash equivalents	1,799,669	1,862,613	62,944
Stocks	1,902,420	2,728,960	826,540
	$3,702,089	4,591,573	889,484

4. Buildings

The buildings acquired by the California Academy of Sciences in Golden Gate Park are not reflected in the accompanying balance sheets since, under the terms of the Charter of the City and County of San Francisco, no one other than the City may hold title to buildings on City property. As the Academy facilities in Golden Gate Park are acquired, title is transferred to the City and County of San Francisco. The buildings were valued at $22,800,000 by the latest insurance appraisal in 1982.

5. Collections, Library and Equipment

Collections, library and equipment are expensed in the year of acquisition and, as such, are not reflected in the accompanying balance sheets. The Academy staff has estimated the replacement cost of collections, library, and equipment to be well in excess of $20,000,000.

6. Employees' Pension Annuity

On January 1, 1964, the Academy adopted a pension plan utilizing individual annuity contracts for all regular full-time staff members under the age of 59 as of that date. On 1 January 1976, this plan was amended to comply with the Employee Retirement Income and Security Act of 1974.

Under the provisions of the plan, the Academy and the employees each fund one-half of the pension cost. The Academy's contributions are based on five per cent of the amount of salary subject to Social Security tax and seven and one half per cent of the amount of salary above the Social Security tax base. Total pension expense for 1983 was $88,795 and $83,399 for 1982.

7. Trusts

The Academy is the ultimate beneficiary under an irrevocable living trust in the amount of $185,196 (market value $255,973). The income of the trust is paid to the grantors and the Academy bears the cost of all trust operations. The assets of the trust are not shown in the accompanying financial statements.

The Academy is the trustee and beneficiary under four irrevocable unitrust agreements which, together, had a market value at 30 June 1983 of $1,871,925. The Academy is a fifty percent beneficiary under two of the agreements and is the sole beneficiary under the remaining two agreements. Each grantor receives an annual amount equal to a stated percentage of the net fair market value of the assets of the respective unitrust, except for one grantor who receives a stated percentage of the net fair market value of the assets or current income, whichever is less. The percentages range from five to eight percent. These trusts absorb the costs of their operations. The assets of the trusts are not shown in the accompanying financial statements. Distributions to grantors under the unitrust agreements, for the fiscal year ended 30 June 1983, totaled $103,382.

In the current year, the Academy was named ultimate beneficiary of a Pooled Income fund with a market value at 30 June 1983 of $119,744. The assets of the fund are not shown in the accompanying financial statements.

8. Support from the City and County of San Francisco

Section 6.404d of the Charter of the City and County of San Francisco states that the City shall provide funds necessary for the maintenance of the Steinhart Aquarium and funds deemed proper for the maintenance of the Academy buildings. During the fiscal year ended June 30, 1983 and 1982, the Academy received $963,187 and $886,428, respectively, from the City and County of San Francisco for this support.

In addition to its annual support, the City and County of San Francisco expended $400,000 on behalf of the Academy. The funds were used to remedy a problem of fresh water intruding into the normal sea water used in some of the Steinhart Aquarium's tanks. The expenses to correct the problem and related support are not included in the financial statements as they do not represent annual on-going support from the City and County of San Francisco.

9. Furniture, Fixtures and Equipment

The Academy departs from generally accepted accounting principles in that it expenses furniture, fixtures and equipment as acquired rather than capitalizing them and amortizing the costs over the useful lives thereof. During 1983 and 1982, the Academy acquired furniture, fixtures and equipment costing $166,930 and $228,823, respectively. The Academy also expended $102,546 in 1983 and $84,223 in 1982 for commercial building remodeling and other construction which was not capitalized.

10. Real Property

The Academy owns an eleven-story, fully depreciated commercial building located in the City of San Francisco. The value as recorded on the balance sheet of the endowment fund represents the cost of the land. The building was valued in excess of $12,000,000 by an appraisal in December of 1982.

In 1979 the Academy received title to 3,117 acres of ranchland in Sonoma County known as Pepperwood Ranch. The Academy, under terms of the grant deed of title, must preserve the property in its current natural state and can utilize the property for research and educational activities for a period of at least ten years. The value as recorded on the balance sheet of the special purpose fund represents the assessed value of the property on the date of the gift of $808,460.

In 1981 the Academy received as a bequest from Donald Patterson, deceased, a fifty-percent interest in a four-unit commercial building located in San Leandro, California. The other half interest is owned by the Society of California Pioneers. Fair market value of the Academy's half of the property on the date of the gift was $87,500 and is recorded in the special purpose fund.

In 1982 the Academy received a bequest recorded at $664,157 from Francis S. Hana, deceased. The bequest included a residence in San Francisco, California, valued at $650,000, household furnishings and cash. The bequest was recorded in the special purpose fund.

11. Income Taxes

The Academy is qualified as a tax-exempt organization under Section 501(c)(3) of the Internal Revenue Code and is not a private foundation. The Academy is also tax-exempt under the laws of the State of California.

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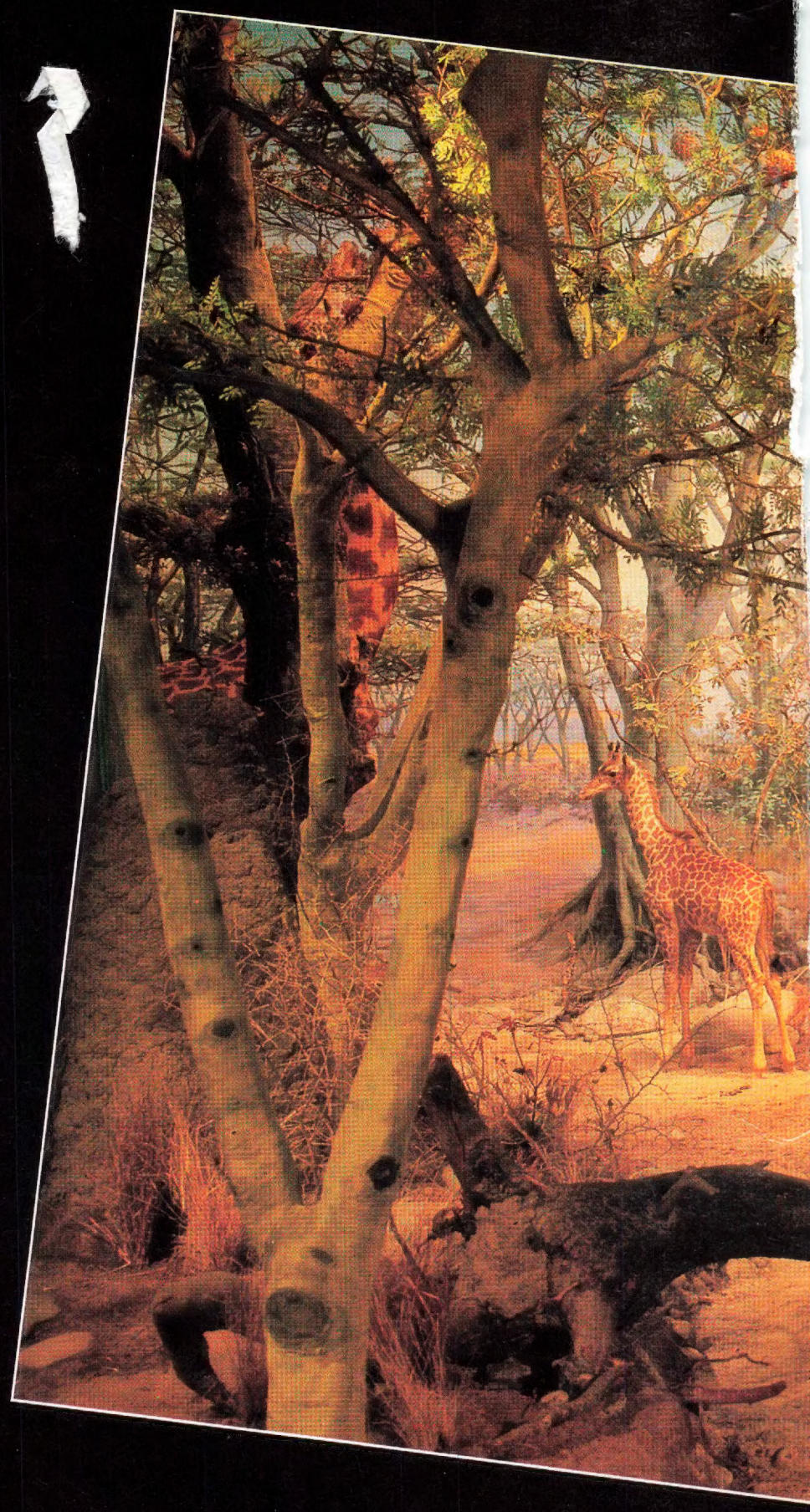
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